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RECOMMENDATIONS CONCERNING PANAMA

Mr. James L. Bristow, who was appointed to investigate trade conditions and other matters affecting the Panama Railroad & Steamship Co., has made public his report. His principal recommendation is the continuance of the Panama railroad, the cancellation of the contract with the Pacific Mail Steamship Co. and the South American lines and the opening of the ports of Colon and Panama to all steamship lines on equal terms. He recommends that in traffic connections American steamship lines be favored as far as is consistent with the treaty obligations of the United States. His recommendations are:

"I would recommend that the Panama railroad be continued as a commercial line; that its facilities for handling commerce be improved at once; that it be double-tracked and re-equipped with modern rolling stock; that its port facilities be enlarged by the construction of additional wharves, and that modern facilities for handling cargo be provided. That a schedule of rates for through business be provided, fixing the charges at the minima which the payment of operating expenses and a fair dividend on the investment of the government will permit.

"That the present policy of charging a percent of the rates on through business, subject to certain minima, be adhered to.

"That the steamship line between New York and Colon be retained.

"That the contracts with the Pacific Mail Steamship Co. and the South American lines be canceled, and the ports of Colon and Panama opened to the use of all steamship lines on equal terms.

"That if, within a reasonable time, a regular steamship passenger and freight service is not established between Colon and the Gulf ports, a line be established by the Panama railroad.

"That if the Pacific Mail Steamship Co. withdraws its present Panama line, an effort be made to induce some other company to establish a first-class service between the important Pacific coast ports of the United States and Panama, and, in the event that no other company is prepared to furnish the service, that it be provided by the Panama railroad.

"That in traffic connections American steamship lines be favored so far as can be done consistently with the treaty obligations of the United States."

NANTASKET BEACH'S NEW STEAMER

The Nantasket Beach Steamboat Co. awarded a contract to the Fore River Ship Building Co., Quincy, Mass., to build a big steel excursion steamboat at a cost of about $150,000, to be added to its already magnificent fleet of Nantasket Beach steamboats. The new boat will be completed in time to go into commission on the Nantasket Beach route next summer. The new boat will have a steel hull and her dimensions will be as follows: 207 ft. 6 in. overall, 200 ft. water line, 56 ft. breadth of guards, 32 ft. 6 in. breadth of moulds, 12 ft. depth of hold, 5 ft. 6 in. draught. She will have six watertight bulkheads and seven watertight compartments. In general, she will be modeled after the Old Colony of the company's Plymouth line, but will be 18 ft. longer and will have some changes which are improvements over the Old Colony. The lunch room will be on the main deck forward and the ladies' cabin on the same deck aft. The saloon deck is patterned very nearly after the style of the Old Colony, as is the hurricane deck.

The steamship Virginia was successfully launched recently at the Harlan & Hollingsworth ship yard. The vessel was released from the ways by Miss Edna E. Sherwood, who, with a silver plated axe made from the steel with which the vessel is built, cut the rope which, by an ingenious method, tripped and pulled down the triggers which held the vessel in position. The rope had hardly been cut when her sister, Miss Virginia Sherwood, both daughters of the vice-president and general manager of the steamboat company, performed the christening by breaking a bottle of wine over the bow of the vessel as the Virginia began to slide down the ways. The Virginia is owned by the Baltimore Steam Packet Co., and was built to meet the requirements of the United States standard rules for the 20-year classification, and to meet the United States government inspection as regards hull and machinery. She is constructed of steel throughout.

Richard L. Farnham, a director of the Panama railroad, has been in England and on the continent for the past two months looking into the prices of steamers and rails. He is represented as saying in an interview that the Panama Railroad Co. is looking for three steamers of 6,000 tons each and that he has received offers of the sale of six vessels at prices somewhat lower than offered of similar vessels in the United States. He has also proposals from seven of the shipbuilding firms of Britain to build the ships at lower prices than it is possible for American builders to construct them.

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LIVERPOOL SHIPPING LETTER

Liverpool, July 17.—Lloyds Register shipbuilding returns for the quarter ended June 30 show that excluding warships there were 472 vessels of 1,301,457 tons under construction in the United Kingdom, the figures for the corresponding period of last year being 392 vessels of 993,088 tons. Of the vessels under construction during the past quarter 440 were steel steamers of 1,296,066 tons (compared with 355 steamers of 982,644 tons); one, an iron steamer of 320 tons (against four steamers of 704 tons), and one a composite steamer of 220 tons, against two steamers of 310 tons; 18 were steel sailing ships of 3,591 tons (against 15 ships of 7,730 tons) and 12 wood and composite sailers of 1,260 tons (compared with 16 vessels of 1,700 tons). The tonnage under construction at the end of March was about 202,000 tons more than at the end of December, 1904. Compared with the total reached in September, 1901, which is the highest on record, the present figures still show a reduction of about 11,000 tons. Of the vessels under construction in the United Kingdom at the end of June, 374 of 994,802 tons are under the supervision of the surveyors of Lloyd's Register with a view to classification by this society. In addition 45 vessels of 128,876 tons are building abroad with a view to classification. The total building at the present time under the supervision of Lloyd's Register is thus 419 vessels of 1,123,678 tons. Of the vessels now being constructed five are of 20,000 tons or over, three of 15,000 tons to 20,000 tons, two of 12,000 tons to 15,000 tons, one over 10,000 tons, five between 9,000 and 10,000 tons. Of vessels between 3,000 tons and 4,000 tons there are 81 building and 79 of between 4,000 and 5,000 tons. There are 41 warships under construction in Britain, eight of 119,950 tons, including three first-class battleships and five first-class armored cruisers at Chatham, Devonport, Portsmouth, or Pembroke, and 33 of 125,040 tons at private yards. These last include two first-class battleships at Dalmuir and Jarrow, six cruisers at Barrow, Blackwall, Elswick (2), Govan and Greenock, 3 scouts at Elswick and Govan, 12 submarines at Barrow and 10 torpedo boat destroyers at Birkenhead, Chiswick (5), Cowes, Jarrow and Poplar (2). These are all British. In addition there are building two battleships at Barrow and Elswick, two torpedo boat destroyers at Chiswick and Poplar and one torpedo boat at Poplar for foreign governments.

The new channel steamer Dieppe has established a new record for the turbine. Much has been said—and perhaps not without some justification—against the system in respect of manoeuvring qualities, and the London & Brighton and South Coast Railway, in association with their continental partners—the Western Railway of France—decided in this new steamer to exact exceptionally onerous conditions in starting and stopping tests. It was required in the contract that the vessel should stop within 100 metres or 109 yards, and because of this some of the firms asked to tender for the vessel refused, but the Fairfield company agreed to the terms, and on the trials between Newhaven and Dieppe, a few days ago, not only exceeded the speed by practically half a mile per hour, but between boats moored on the French coast exactly 100 metres apart brought the vessel to a state of rest in less than the stipulated distance. The speed of approach to the first boat as required by the contract, was 12 knots. This was exceeded, yet the vessel was stopped and began reversing a few yards from the second moored vessel. This proves that the turbine system has greater stopping movement than one with ordinary engines. The time taken was about 40 seconds. As regards speed, the difficulty with the Newhaven and Dieppe boats is the limitations in the length of hull owing to the tortuous channel up Dieppe harbor. This precludes a greater length on the water line than 280 ft., which makes high speed difficult of realization, but with improvements to the harbor now contemplated this will be improved in later ships. The contract condition in the Dieppe was that the vessel should on a run in each direction attain a speed of 21.19 knots. On the run to Dieppe the speed was 21.523 knots, and on the return trip 21.764 knots, a mean speed of 21.643 knots

The following were the receipts from shipping using the Suez canal in the month of June, and the first six months of the last three years. It will be noted that the number of ships and tolls were exactly the same in the months of June, 1904 and 1905. There was, however, an appreciable increase in both ships and receipts in the six months:

	Months of June,		
	1905	1904	1903
Ships	301	301	284
Receipts	8,410,000f	8,410,000f	7,780,000f

	Six Months of		
	1905	1904	1903
Ships	2,220	2,051	1,881
Receipts	59,497,340f	56,153,799f	50,654,411f

The use of the metric system in weights in Britain would seem to be making steady headway. At the Liverpool docks there has for some time past been a 50-lb. standard, and the Mersey Docks Board has just received a communication from the Board of Trade legalizing 20-lb., 10-lb. and 5-lb. weights. Octagonal weights of these denominations are now being prepared, and they will prove especially acceptable to those who are dealing with cotton and corn. Already many expressions of approval have been made at the innovation.

It is stated on very good authority here that the general manager of the Cunard Steamship Co. has had just recently a conference with representatives of German steamship lines as a result of which the old state of relations with the Continental lines will be resumed as the price of certain concessions to Germans. All opposition to the Cunard's emigrant traffic from Scandinavia to America and Canada has been withdrawn, and the Cunard line will be allowed to make good their share of emigration from Antwerp and Rotterdam, which they captured from the Red Star line during the recent rate war. Receipts from these two sources will be pooled and divided as before.

The strike of some 600 Liverpool dock laborers engaged in discharging the steamers of the Harrison line because of certain of the foremen being non-unionists, still continues, with no sign of either side giving way. Messrs. Harrison are particularly firm in their attitude of resisting the men's demands, and have imported some 800 men from other ports in the country. There is great danger that unless the men can be persuaded to give way, a general strike throughout the dock at Liverpool and Birkenhead will be the result. This it is hoped will be avoided, and at the time of writing the Lord Mayor of Liverpool is using his influence with the men to that end. It is not thought that he will succeed.

The steel schooner yacht Invader, built for Roy A. Rainey, of the Larchmont Yacht Club, was launched recently from Lawley's shipyard, East Boston, Mass. She was designed by A. S. Chesbrough and Frederick Lawley. The Invader is 136 ft. over all, 95 ft. on the water line, 25 ft. beam and 13 ft. draught.

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NEW TURBINE CUNARDERS

Considerable interest attaches to the great Cunard liners which are now under construction—one at Swan & Hunter's on the Tyne, and the other at John Brown & Co.'s works, Clydebank. An especially instructive article on them is printed in the current issue of the Scientific American.

It is known that the new Cunarders are to be the largest ships ever built; but it is not generally realized how very much larger these ships are to be than any of the huge liners which now excite our wonder by their great proportions. The increased dimensions are shown in the accompanying table, which includes the largest of the ocean liners that have been built of late years; and on comparing the Cunarders with the largest of the existing fast passenger ships, the "Kaiser Wilhelm II.," we find that she is longer by 94 ft. than that vessel; that she has 7½ ft. more molded depth; that she has 16 ft. more beam; that her designed horse-power is nearly twice as great; that her displacement is 13,000 tons more; and her sea speed will be 1½ knots greater. Furthermore, in view of the fact that turbine engines invariably develop a horse-power greatly in excess of the contract, it is possible that on her trial she may make 26 knots an hour, or 2½ knots more than the record speed of the "Kaiser Wilhelm II."

THE BIG STEAMSHIPS OF THE WORLD.

	Length over all in feet	Beam, feet	Depth, feet	Displacement	Horse-Power	Speed
Great Eastern	692	83	57½	27,000	8,000	14.25
Lucania	625	65	42	19,000	30,000	22.01
Oceanic	704	68	49	28,500	28,000	19.50
Deutschland	686	67	42	23,000	37,500	23.5
Baltic	725	75	49	40,000	18,000	16.25
Kaiser Wilhelm II	706	72	52½	30,000	40,000	23.5
Turbine Cunarders	800	88	60	43,000	75,000	25.

It was not the original intention to make these vessels of such extreme proportions. They grew to the dimensions ultimately adopted, as the result of the elaborate studies that were made, both at the towing tank and at the designing board. The first tentative plan called for a vessel 700 ft. in length. This grew to 720 ft., and finally to the present overall length of 800 ft. The beam is 88 ft. measured over the skin plating, or 87 ft. 6 in. to the outside of the frames; the plating, by the way, being 1½ in. in thickness, which, on the lap, will bring it to a total thickness of 3 in. on each side. The plated depth is 60 ft., which may be compared with the 42 and 49 ft. molded depth of such ships as the Deutschland and Oceanic, the plating being, in this vessel, carried up one deck higher. This increase is rendered necessary by considerations of the longitudinal girder strength of the ship as a whole, and is one of the means by which the necessary shearing strength is obtained. The extreme draught is 36 feet; but this, of course, can only be availed of when the new Ambrose Channel into New York harbor shall have been fully dredged out. The government has promised sufficient depth in this channel, by the time the Cunarders are ready, to enable them to come and go, drawing 33½ ft. of water. On the latter draught they will displace a little over 40,000 tons, and on the full draught of 36 ft. they will displace about 43,000 tons. Of the dimensions given above, the beam is the most striking, and these ships are the first to exceed in beam that accepted standard of measurement for modern steamships, the Great Eastern.

The double bottom, which is the most important structural element in the hull, will be 5 ft. 6 in. in depth between the outer and inner shells. There will be a dead rise of 18 in. from the keel to the bilge, and the frames will decrease from 5 ft. 6 in. at the keel to about 4 ft. in depth where the curve of the bilge straightens into the sides. There will be about twenty longitudinal frames, consisting of heavy built-up I-beam sections, extending, some of them, the full length of the ship. The great width of the ship enables the Scotch boilers, which will be of the largest size, to be placed four abreast, and still leave room for large coal bunkers in the wings. There are eight decks in all. First, the orlop deck, just above the boiler rooms, on which, in this particular part of the ship, there will be space for carrying the regular ship's stores; the deck above, known as the lower deck, will be devoted largely to third-class passengers. A feature that will add considerably to the comfort of these passengers will be the subdivision of the space into separate staterooms. The waterline will be at the level of this deck which will be lighted with portholes, and thus provide a large number of outside staterooms for the third-class passengers. The main deck will be given up to first-class staterooms. The upper deck, also, will be devoted to first-class accommodation, and on this deck will be the great dining saloon, which will extend the full width of the ship, providing a single room over 80 ft. in width by 125 or more feet in length, and capable of seating over 500 people. In the center will be a large overhead well, which will extend through two decks and be crowned with a dome of cathedral glass. The fifth, or shelter deck, completes the molded portion of the vessel, and is 60 ft. above the keel. The three decks above this, known as the bridge deck, promenade deck and boat deck, are devoted to first-class passenger accommodation, and they have, on each side of the central tiers of staterooms, a broad promenade open to the weather.

How greatly these ships will exceed all others in the nature of the passenger accommodations is shown by the fact that the first-class staterooms are to be 50 percent larger than the customary size. The total height of the ship, from the keel to the boat deck, is about 90 ft., or the height of say an eight-story building. In the presence of such dimensions, the problem of what might be called "vertical travel" becomes a serious one. On shore we have overcome it by the adoption of the elevator; and with the growth in size and steadiness of the giant passenger ships, the time has now come when the passenger elevator can be applied with perfect safety to these floating hotels. The Cunard company was the first to incorporate the elevator in the plans for its new ships; and it may be interesting to state that the first practical suggestion of the use of the marine elevator was made in 1902 by a member of the staff of the Scientific American to Mr. Vernon H. Brown, the general manager of the company in America, who thought so well of it, that he forwarded the suggestion to the Liverpool office with his approval of it as a practical improvement. The suggestion was adopted, and at once incorporated in the plans of the ship. There can be no question of the great convenience that will be afforded by a passenger elevator on board large steamships, and it is pretty certain to be generally adopted.

The motive power will consist of four turbines, each of a designed indicated horse-power of 18,000, which latter, by the way, is about the total horse-power of the City of Paris and the City of New York. All four turbines will be placed upon the same platform; but while the propellers of the inside pair will be located just forward of the rudder in the usual position, the propellers of the

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outside pair if turbines will be located forward of the inner pair, the great beam of the ship admitting of this arrangement. Although the contract horse-power is about 71,000, the boiler power is sufficient for 75,000 H. P., and 75,000 H. P. with reciprocating engines would, according to the tank test, give a speed of 25 knots an hour. Mr. Hunter, of the firm of Swan & Hunter, where one of these ships is being built, has supplemented the tests of the tank models, constructed on a quarter-inch scale, by building a working model on a ¾-inch scale, which is 50 feet in length. He has equipped this model with turbines and four propellers, and has been making a large number of tests with propellers of every conceivable practical type. The results of these experiments, of course, are not available outside the company, but it is sufficient to say that they are very promising for the complete success of the great ships themselves. As regards the speed of the vessels, they must show an average of 24½ knots an hour on actual voyages. Judging from the way in which the steam turbines in the British cruiser Amethyst ran ahead of the anticipated results, we shall not be surprised to see these vessels exceed an average speed of 25 miles an hour from port to port under favorable conditions.

MANCHESTER SHIP CANAL DEVELOPMENT

The great strides that Manchester as a shipping port has made during the last few years, has necessitated the provision of additional dock accommodation, the eight basins originally provided when the ship canal was constructed being found totally insufficient for the growing over sea trade. If the ship canal has not yet been able to bring any financial return to the original shareholders who promoted the undertaking, it can at least be said to have done incalculable good for the manufactories of Manchester and the thickly populated business towns within a thirty-mile radius of that city, indeed this area is now one of industrial activity such as has never been known before. Trafford Park, the site of the present Manchester docks and businesses associated with it was less than 20 years ago the stately seat of the De Trafford family. The labyrinth of fine business places which have been established there describes more eloquently than words can the rude awakening of this once sequestered demesne over whose green stretches the deer gamboled and whose expanse of verdure was only broken on the one side by the sable river Irwell, whose waters did not dream of the time when they would carry a majestic fleet of ocean-going ships. The Trafford Park now is the venue of a hundred and one business enterprises, housed in buildings which afford a striking example of modern warehouse architecture, in which American ideas are strikingly prominent in Westinghouse undertakings there. Upon this site and the adjoining old race courses probably the greatest transformation has taken place, for both have been given over to the fulfilment of the designs of the ship canal company, and now contain huge docks into which some of the largest vessels afloat can steam to dispense the foodstuffs and commercial materials brought from many lands. The ship canal has in short changed the aspect of the whole district, and brought in its train of development a floating polyglot population, the novelty of which only time can remove. The new dock under notice has been built on the old Manchester race course, which immediately adjoins the Trafford Park, and this property came into possession of the canal company at the beginning of 1902. After careful inquiry into the pressing needs for additional berthage and shed accommodation, it was decided to construct a very large dock with transit sheds on one side, and an open quay for timber and similar cargoes on the other side, together with railways, roads, cranes, and other necessary equipment at an estimated cost of $2,000,000. The available capital funds were insufficient for this purpose, for out of the money received for the Duke's dock at Liverpool, sold by the company to the Mersey Docks & Harbor Board for $3,610,000, at least $1,800,000 had already been spent on land and incidental charges, and the balance was being spent on laying out other portions of the dock estate in other ways. Accordingly, the consent of the Manchester corporation was asked and obtained to the raising of a further sum of $2,500,000, and later a contract was signed with a company called the Manchester Dock & Warehouse Extension Co., Ltd., under which that comapny undertook to provide the $2,500,000 required, or rather to provide at that cost the dock and warehouses required, and to let them to the canal company when finished at a rental of 5 percent on the cost for a term of 99 years, after which they should revert to the canal company. Thus did the ship canal company overcome the financial difficulty which faced them. An arrangement was also made to the effect that the canal company could at any time, after short notice, take over the works, or property, upon paying their actual cost to date, plus a premium of 5 percent.

The accompanying illustrations give a fair idea of the appearance of the new dock, and the fine series of transit sheds, the equipment of which is equal to anything which can be shown in any part of the universe. The description of the work given below is derived from official sources, and will convey some idea of the thoroughness with which the scheme has been carried through. The new dock is 2,700 ft., over half a mile long, by 250 ft. wide. In other words, the water area is 15½ acres, with a depth alongside the quays of 28 ft., a depth to which the canal from end to end will shortly be carried. The entrance to the dock, which is some 400 ft. wide, has been formed by the removal of Salford quay wall, and has been so formed as to allow either on the upward or downward journey entrance to the dock with the greatest ease. The quay walls have been constructed on a new principle. Instead of being made on a continuous wall of concrete, the quays are carried on a series of arches very much like a railway viaduct. The arches, however, are below water level, and the appearance of the dock does not indicate any variation from the ordinary method of construction. On the south side of the dock is a series of five transit sheds with four floors each and providing a storage accommodation amounting to some 22 acres. The sheds which have been constructed of reinforced concrete on the Hennebique system, were completed in eighteen months. It is claimed that this system combines more effectively than any other the important features of reasonable cost and resistance to fire. Roadways 25 ft. wide separate the sheds from each other, and to further minimize the risk of damage each shed is divided by a fire-resisting partition across the center, the doors of which are closed in with steel sliding doors. The transit sheds are further provided with a double line of rails, both in front and behind, and the goods will be loaded or unloaded by 20 electric cranes which will run on a special road on the edge of the quay, and which are of such dimensions as to command every floor of the sheds. The loading out from the sheds into wagons or lurries will be effected by two fixed electric cranes on the roof of each of the transit sheds, and twenty-five electric hoists in teagles at the back of a veranda on the south side to enable goods to be transferred to railway trucks or lurries under shelter from the weather. At the east end of the dock a large grain elevator, with a capacity of some 40,000 tons of grain will be constructed and conveyor galleries have been formed

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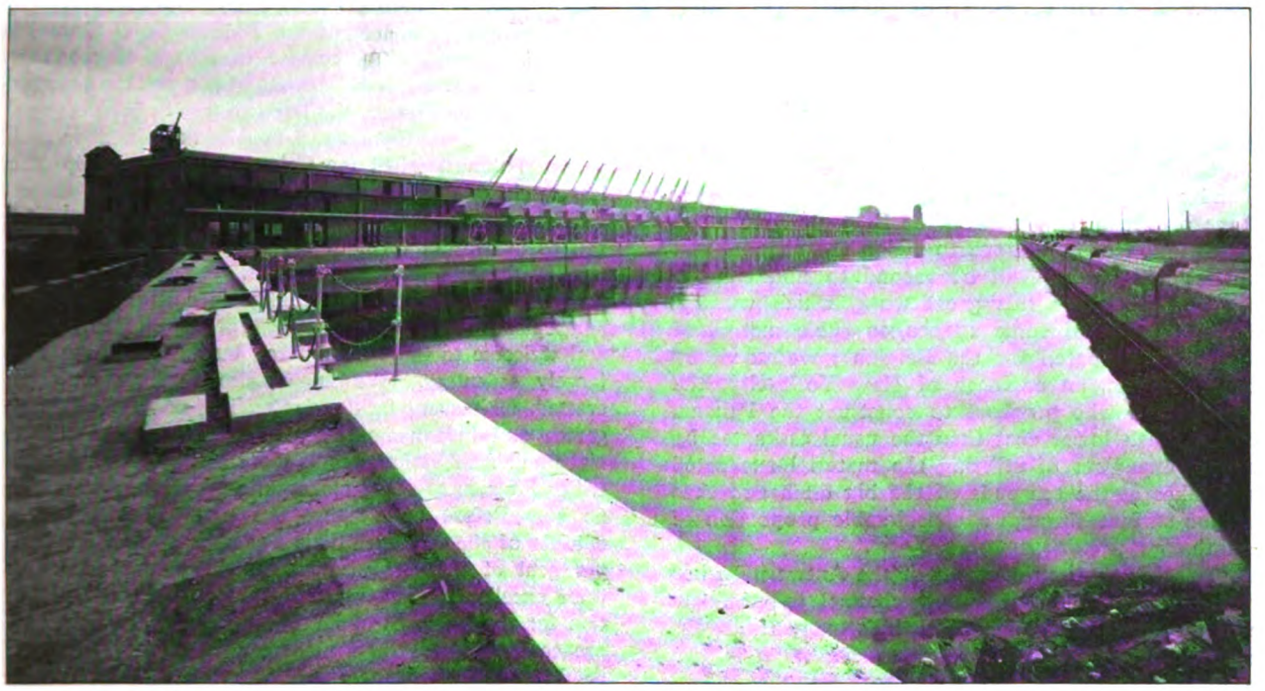

THE HUGE NEW DOCK OPENED AT MANCHESTER.

under the quays, north and south of the dock, to enable grain to be transferred from the vessels' holds into the elevator without interfering with the unloading of general cargo, thus effecting a considerable saving in time by obviating the necessity of moving the vessel from her berth in the dock to the grain elevator for the purpose of unloading the grain. On the north side of the dock are provided a crane road and two lines of railway, behind which is an open quay for dealing with timber, iron, ore, and other cargo which does not require shelter. Behind the open quay again is a paved road and a double line of railways for the inland distribution of cargoes. The motive power, as well as the lighting of the docks and sheds, will be entirely electric. The new dock will provide accommodation for berthing simultaneously ten of the largest vessels that can use the canal, and one smaller vessel. Future requirements of the traffic will be met by a further extension of the docks on the northerly side of the new dock, where a site has been reserved for another dock of nearly the same dimensions as the one now described. An early demand for this extended accommodation is anticipated, and even at the present time negotiations are pending which will have an important bearing upon the future success of the canal.

On the occasion of the opening ceremony by King Edward on Thursday, July 13, great preparations were made by both the civic and the canal authorities, which so impressed His Majesty that he knighted on the spot the Lord Mayor of Manchester, Mr. Thomas Shann. Mr. J. K. Byshell, the able manager of the canal company, was also complimented by the King upon the excellent arrangements he had made.

It may be interesting to add that the Manchester ship canal was opened by Queen Victoria in 1894, and is 35½ miles long by 26 ft. deep, but the depth is now being made 28 ft. The Manchester Dock estate comprises 406½ acres, including the water area of 120 acres. There are six miles of quay. The dimensions of the nine docks vary from 700 ft. long to 2,700 ft. long. Railways have been laid on all the dock quays, and the dock railway, 61 miles in extent, is directly connected with the railway systems of the whole country. The development of the trade of the port has been steady and continuous, as the following figures show:

Year.	Seaborne Merchandise in tons.	Revenue in dollars.
1894	925,659	
1895	1,358,875	$ 489,505
1896	1,826,237	687,370
1897	2,065,815	911,650
1898	2,595,585	1,023,320
1899	2,778,108	1,181,125
1900	3,060,516	1,323,875
1901	2,942,393	1,454,150
1902	3,418,059	1,545,585
1903	3,846,895	1,985,130
1904	3,917,578	2,090,215

THE COPPER HANDBOOK

The fifth annual edition of the Copper Handbook, published by Horace J. Stevens, Houghton, Mich., contains sixteen chapters, devoted to the history, uses, terminology, geology, geography, chemistry, mineralogy, finances and statistics of copper. The major part of the book is occupied by the chapter devoted to detailed descriptions of the copper mines of the world, 3,849 in number. These descriptions range from two lines to twelve pages each, according to importance of the property. In the five years of its issue the Copper Handbook has grown from a strictly local publication, the first issue having been devoted exclusively to Lake Superior mines, to a standard reference book in use in every country on the globe that produces copper. The publication is the world's standard reference book on copper, having no competitor in this field. The book is sent fully prepaid, on approval, to any address in the world. This offer has been made for the two preceding years, and the percentage of losses through books returned and retained but not paid for has been very small.

The old bark Yosemite, built at Portsmouth, N. H., in 1868, has been bought by Captain J. Bergman of San Francisco. She is a three-masted wooden bark of 1,154 tons register and in spite of her age is still pretty staunch. She was one of the smartest American clippers and has made some quick passages between New York and San Francisco.

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ANTWERP WILL HAVE HARBOR SECOND TO NONE

Antwerp, the metropolis of Belgium, has lately grown remarkably in importance as a seaport, the tonnage seeking its docks having increased 51 percent during the years 1890 to 1900. The river quays, including a stretch under construction, have a length of 17,500 ft. There are eight docks and three basins with a total area of 170 acres and a water frontage of 30,000 ft. But the facilities have proved inadequate and the Belgians have made an appropriation of $50,000,000 to widen the channel and construct docks, which will be second to none in the world. The plans for this great work, which will involve the removal of some 100,000,000 cubic metres of material, were prepared for the Belgian government by Lindon W. Bates, an engineer of New York city, the same gentleman who proposes to construct the Panama canal at a much lower cost than the usual estimates by the simple expedient of utilizing the material excavated to build dikes at the sea ends of the big ditch and thus elevate the surface through a considerable proportion of the length.

The plans for the improvement of the Antwerp harbor involves the excavation of a new channel to eliminate some of the worst of the river Scheldt's many turns, the deepening of the approaches so as to admit the largest ocean-going ships at all stages of the tides, the utilization of the portion of the river to be cut off for docking purposes and the construction of a large artificial basin with quays to afford additional accommodation.

Easy access to the port will be secured by two gigantic waterways. The river itself will constitute the first of these channels and will offer a 13,800 meter line of directly accessible quays instead of the present 5,500 meter line. The second channel will be formed by the canal basin connected with the river at a point near Kruisschans by three parallel locks, each of which will have a length of 300 meters, a width of 30 meters and a depth of 8 meters at low water and 12 meters at high tide.

The canal basin will have a length of 8,000 meters, a width of 250 meters and a depth of 12 meters. The canal basin itself is connected with 9 lateral basins, running nearly parallel with one another and each 1,200 meters long, 200 meters wide and 12 meters deep. As a result of this arrangement ships on their way to and from the basins will not be compelled to pass through the roadstead, which will thus remain free for the movement of vessels to be moored to the river quays. Moreover ships on their way to the basins will no longer have to waste time turning and manoeuvering in order to get to their docks. They will enter the canal basin in a straight line through one of the parallel docks which open in the direction followed by ships entering the port, and reach the canal and lateral basins without being obliged to turn or put about.

Five dry docks will be provided near the entrance of the canal basin, one of which will have a length of 250 meters to accommodate transatlantic steamers.

The length of the quay walls will be 46,600 meters, against 13,000 meters at the present time, and 16,000 meters after the completion of the intermediary work begun some time ago. The area included between the new bed of the Scheldt and the canal basin is a strip of land containing 110 hectares, which will be used for construction purposes and will be enclosed on both sides by quays 200 meters wide.

The new port of Antwerp will therefore have a line of quays 60,500 meters long, almost three times the present length, including that of the basins now under construction.

SAILED FOR PANAMA

Pres. Theo. P. Shontz of the Panama Canal Commission, John F. Stevens, chief enginer in charge of construction, W. E. Nazro and Ed. A. Moffatt of the welfare department of the Civic Federation, the last two having been engaged by the Panama Canal Commission to solve the recreation problem on the Isthmus, sailed for Colon on the steamship Mexico last week.

When seen on the Mexico President Shonts expressed himself as heartily in favor of any plan to make the life of the men on the Isthmus more pleasant.

"These opportunities for wholesome open-air exercise and amusement," said Mr. Shonts, "will be especially valuable and welcome to the clerical force and others whose work is largely sedentary. We intend also to have club houses erected, with every facility for reading and for all kinds of games and indoor amusements. In connection with these clubs and their various rooms there will be reasonable opportunity for men to spend money in a proper way who wish to do so. Before undertaking this plan we consulted with officials of the National Civic Federation. The welfare department of that organization has put into practical shape some excellent ideas for providing entertainment and recreation for the employes of large industrial establishments. We are convinced that these plans can be adapted to meet the conditions on the Isthmus. We shall take with us accordingly two experts that the National Civic Federation has furnished to look over the field and prepare definite plans.

"These plans will include also better houses and quarters for the men. The problem of housing is highly important, and clamors for immediate consideration. We recognize that a government employe down on the Isthmus is entitled to a habitation and surroundings in keeping with his American standard of living."

President Shonts then briefly discussed in a general way the canal work proper.

"The first thing for us to do," he said, "is to get down and see that the under-lying conditions for the work are good before going ahead. For this reason it is necessary, first of all, to see that the sanitation and general health conditions are good, and that the men are made contented with their lot. The French Company, before us, were no fools, and we must profit by their experience. They found out that before they could go ahead they had to stop and clean up the Isthmus. As a result of this there was no sickness there until about the time the United States got in. I pay no attention to the complaints of those who have returned from the Isthmus. They are for the most part men totally unfit, and should not have gone down there in the first place. The men who have remained on the Isthmus have no complaint except that they have nothing to do but work. They have no friends, except themselves, no amusements, and being 2,000 miles from home, are of course in a great many instances, homesick. What they need is amusement, healthy games, and outdoor exercise. In order to remedy this we are going to establish this recreation department to which I have alluded. It will be under the control of a competent man, and Mr. Nazro, who is sailing with us, will probably be the head of it, although no agreement has yet been reached."

Asked whether a lock or a sea level canal has been decided upon, Mr. Shonts replied:

"Mr. Stevens and I have talked the matter over with the President in a general way, but of course nothing was decided upon. I should say that it would take about a dozen years to construct a sea-level, and about five years to build a lock canal."

Chas. S. Rohde & Son, Baltimore, have launched the hull of the dredging machine for the Potomac Dredging Co., of Washington, D. C. The dredge is 90 ft. long, 36 ft. beam and 9 ft. deep.

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BELLEVILLE BOILERS IN THE EURYALUS

In view of the interest taken in the boilers of British warships and the articles which have appeared in your valuable paper on this question, the following results of a passage trial may be of value. The original contractors' and present trial are tabulated:

CONTRACTORS' TRIAL.

Date.	Hours duration.	Revs. per min.	I. H. P. developed.	Coal per I. H. P. all purposes.	Description of coal used.	Air pressure in boiler-rooms.	Draught of ship.	Speed in knots.	Weather conditions.
July 1, 1903	8	125.5	21,302	1.93 lbs.	Hand-picked Welsh.	.34 in.	Fore 25 ft. 9 in. Aft 26 ft. 9 in.	21.635	Sea smooth, light airs.

PRESENT TRIAL.

Date.	Hours duration.	Revs. per min.	I. H. P. developed.	Coal per I. H. P. all purposes.	Coal used.	Air pressure in boiler-rooms.	Draught of ship.	Speed in knots.	Weather conditions.
April 17, 1905	8	120	20,147	2.36 lbs.	Westport, New Zealand.	.5 in.	Fore 25 ft. 2 in, Aft 26 ft. 10 in.	22	Sea smooth, wind-beam 1-3
April 17, 18, 1905.	16	105	13,326	2.26 lbs.	Westport, New Zealand.	nil.		18 3	Sea smooth, light airs.

By studying these tables it will be seen that, comparatively, the results of the present trial are superior to those of the original trial, as New Zealand Westport coal is of a bituminous description, and not less than 10 percent inferior in calorific value to good Welsh coal when used for steaming purposes. The speed of 22 knots was checked both by log and over the land by taking bearings. The success of the trial is attributed, firstly, to the boilers, which are of the Belleville type, being in an efficient condition, and to the training which the personnel has had since commissioning, the horse-power being 1,000 in excess of any previous passage trial. Westport coal was burnt on each occasion. There was an absence of leaky nickels, and the fusible plugs remained intact, thus allowing the smoke-box doors to be kept closed the whole time, and a steady pressure of steam to be maintained. In comparing boilers for war purposes, the amount of refit, with its attendant strain on the mechanical ratings, undertaking them, cannot be ignored, and all water-tube boilers require their defects to be kept pace with.

The above passage trial results have been obtained after steaming a distance of 36,000 miles since January 23, 1904, not including many days when steaming for necessary exercises, such as torpedo, target practice, etc. It has been done by attention and hard work on the part of the engine-room department. The results show conclusively that Belleville boilers, when efficient and in the hands of a well-trained staff, will give good results, but to be kept efficient much work has to be performed, requiring keenness on the part of those employed.

The Sydney Morning Herald for April 19 says: "An interesting full-power steam trial was made by the Euryalus on the run from Hobart to Sydney. The test was one of 8 hours, from 8 a. m. to 4 p. m., on Monday last. The vessel was half way up the Tasmanian coast at the time the trial was commenced, and at the expiration of the eight hours the Euryalus was in the vicinity of Gabo Island. The average speed maintained during this trial was 22 knots, thus breaking all previous records of the flagship, and eclipsing her performance on the occasion of her official trial trip at the time of her completion. During the remainder of the run to Sydney the Euryalus steamed with three-fifths of her horsepower, which gave her a speed of between 18½ and 19 knots. The other vessels of the fleet also carried out steam trials with satisfactory results. The commander-in-chief of the Australia station, in a memorandum which was read to the ship's company of the Euryalus, expressed his satisfaction at the results in fast steaming, and complimented the engine-room department on the efficiency attained.

A joint committee representing the Erie, Pa., chamber of commerce and the Erie board of trade visited Pittsburg last week in the interest of a movement to have Erie selected as the lake entrance of the Lake Erie and Ohio River ship canal. Judge Frank Gunnison, H. E. Fish and former Mayor William Hardwich represented the board of trade while the chamber of commerce was represented by its president A. B. Osborne, Robert J. Moorehead and Frank Wallace. The visitors were entertained at luncheon at the Union Club and brief speeches were made on behalf of Erie as a terminal. The committee invited the directors and engineers of the canal company to visit Erie sometime in September and the invitation was accepted by unanimous vote.

The last year there was formed at Buffalo the Association of Passenger Steamboat Lines, with Geo. Day of the Hudson River Day Line as president and W. F. Herman of the Cleveland & Buffalo Transit Co. as secretary. This association held a meeting at Buffalo last week to perfect the organization. A further meeting will probably be held in the fall. The purpose of the organization is to secure an interchange of thought among the passenger lines and to act as a unit upon legislation affecting passenger interests.

The Canadian Shipbuilding Co., Toronto, recently launched the steel dipper dredge for the Canadian government. The dredge is 90 ft. long 36 ft. beam and 9 ft. deep and is of the boom type, carrying a two-yard dipper. It will be used on the lower St. Lawrence and is fitted with both salt and fresh water machinery.

Half a million dollars more will be required to finish the work at Southwest pass, Texas, now under construction, and in his annual report Lieut. Col. Clinton M. Sears, government engineer, who is in charge of the district, recommended that an additional appropriation of $500,000 be made by Congress. At Southwest pass the government contemplates digging a ship channel 35 ft. deep and 1,000 ft. wide, so as to permit the largest ocean vessels afloat to reach New Orleans.

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SAULT CANAL CELEBRATION

The semi-centennial of the opening of the first ship canal at Sault Ste. Marie to navigation will be celebrated on Wednesday and Thursday of next week. Assurances of a large attendance have been received, and it is likely that all the leading vessel and iron men will be present. While the program has not yet been announced it will consist of a fine maritime display, parade, fireworks and public speeches. The Hon. Peter White of Michigan made a journey to Oyster Bay expressly to invite President Roosevelt in person but the president's engagements were such that he could not attend. It is understood that Vice President Fairbanks will represent the executive. Appropriations both public and private have been generous and a celebration commensurate with the dignity of the event will be held. The celebration will be international in character as Canada has also made appropriations and intends to take an active part in it. The Canadian canal, which has now been in commission for nearly ten years, will be brilliantly illuminated, and at night there will be along its banks a fine display of fireworks. The arrangement for the Canadian celebration will be under the direction of J. C. Boyd, superintendent of the Canadian canal, acting in conjunction with Chas. T. Harvey, the chief marshal of the celebration. Special rates have been made on the Michigan Central to Sault Ste. Marie, and it is expected that the attendance will reach thousands.

In order to lend picturesqueness to the occasion, the Indian colony at Desbarets will attend. The principal historical address will be delivered by the Hon. Peter White of Michigan, chairman of the commission, and Vice President Fairbanks, United States Senator Burrows, Congressman T. E. Burton and Mr. W. A. Livingstone, president of the Lake Carriers' association are expected to speak.

Ground was broken for the first canal in the spring of 1853 and water was let into the completed channel on April 19, 1855. The locks were opened to navigation on June 18 following, and the first vessel to pass through was the side-wheel steamer, Illinois, up-bound. The steamer Baltimore passed down immediately thereafter, and thus, navigation that for centuries has been prohibited between Lake Superior and the lower lakes was an assured fact. Prior to the canal freights had been portaged around the rapids, a distance of about a mile and a half. In this manner the early shipments of iron ore were made.

Iron ore was discovered in the upper peninsula of Michigan in September, 1844, and in 1845 and 1846 a few hundred pounds of it were carried away on the backs of prospectors. The first shipment of iron ore from the upper peninsula is credited to A. L. Crawford of New Castle, Pa., who ordered about five tons of it in 1850. The first shipment, however, of which the record remains was that of six barrels consigned to B. L. Webb of Detroit. This ore was shipped in 1852 by Peter White of Marquette and the bill of lading has been preserved by the firm of Oglebay, Norton & Co. of Cleveland.

In 1853 The Sharon Iron Co. which owned the Jackson mine at Negaunee, shipped about 150 tons to Erie. The first boat-load of this ore was sent by canal to Sharpsville furnace near Sharon, then owned by David and John P. Agnew and was used in the furnace partly alone and partly in mixture with native ores. The iron produced was of an excellent quality, but it is doubtful if the smelting was successful in so far as the furnace was concerned. It left the furnace in very bad shape indeed.

The second boat-load of this ore was shipped to Clay furnace then operated by Frank Allen who maintains that while the iron produced was of good quality, the ore was really not successfully smelted until after three years of experimentation.

The first shipment of ore through the canal at Sault Ste. Marie was on the brig Columbia and consisted of 132 tons. It was shipped by the Cleveland Iron Mining Co. and was consigned to the Cleveland Iron Mining Co. and was passed through the canal on August 17. During that year 1,449 tons passed through the canal, all of which was sent by the Cleveland Iron Mining Co., the other two companies, the Jackson and Lake Superior not being prepared to ship any ore at all.

The next year 36,346 tons of ore were shipped, and by 1809 the shipments had reached 114,401 tons. On the outbreak of the civil war they fell to 49,009 tons.

Shipments increased steadily each year thereafter with a few intermittent years of depression, but it was not until 1873 that shipments exceeded 1,000,000 tons and not until 1881 that they exceeded 2,000,000 tons. In point of fact, the development of the Lake Superior iron ore trade has been quite recent. One-third of the total shipments since iron ore was discovered have been the movement of the past five years and more than three-fourths of all the shipments the movement of the past ten years.

In this connection the following poem by John G. Whittier published in June, 1855, in the Johnstown Tribune, then edited by James M. Swank, general manager of the American Iron and Steel association, is interesting for its prophetic quality.

I hear the far-off voyager's horn,
I see the Yankee's trail—
His foot on every mountain pass,
On every stream his sail.

He's whistling round St. Mary's Falls
Upon the loaded train;
He's leaving on the Pictured Rocks
His fresh tobacco stain.

I hear the mattock in the mines,
The axe stroke in the dell,
The clamor from the Indian lodge,
The Jesuits' chapel bell.

I see the swarthy trapper come
From Mississippi's springs,
And war chiefs with their painted brows,
And crest of eagle's wings.

Behind the squaw's light birch canoe
The steamer smokes and raves,
And city lots are staked for sale
Above old Indian graves.

By forest, lake, and waterfall
I see the peddler's show,
The mighty mingling with the mean,
The lofty with the low.

I hear the tread of pioneers,
Of nations yet to be,
The first low wash of waves where soon
Shall roll a human sea.

The rudiments of empire here
Are plastic yet, and warm;
The chaos of a mighty world
Is rounding into form!

Each rude and jostling fragment soon
Its fitting place shall find—
The raw material of a State,
Its muscle and its mind!

And westering still the star which leads
The new world in its train
Has tipped with fire the icy spears
Of many a mountain chain.

The snowy cones of Oregon
Are kindled in its way;
And California's golden sands
Gleam brighter in its ray.

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HEAVY MOVEMENT OF ORE

The expedition with which ore is now being handled on the great lakes has never hitherto been approached. Moreover, the greater part of it is being handled by contract vessels as chartering is extremely light. Coal shipments have been exceedingly small so that ore is bearing the brunt of the bulk freight trade. Owing to the depth of water carriers are loading deeper and deeper, so that a number of the 10,000 ton vessels are really carrying more than 10,000 tons. The new steel steamer, Lyman C. Smith, came down the lakes this week with 10,237 gross tons, which is only a few hundred tons less than the record made by the Gary. However, this very circumstance of loading deep caused serious delay at the Lime Kilns this week, when the larger carriers were held up for nearly two days on account of the shift in the water level. This in turn sensibly influenced the situation at Lake Erie docks, all of them getting into good shape and being able to handle more than they really had to care for. Notwithstanding the great volume of ore that is being moved, excellent dispatch is being received at docks, due principally to the abundant supply of cars. Two years ago docks were seriously stalled owing to the inadequate car supply, but this year no such condition exists.

It has been found impossible to determine the exact amount of work of each machine in unloading the steamer Geo. W. Perkins, when 10,514 tons were taken out of her in four hours and ten minutes. All this ore was unloaded into cars. The cars were all in waiting and were moved slowly under the machines while they were working. In this manner cars begun by one type of machine were finished by the other, and it was absolutely impossible to weigh the exact amounts taken out by each. The clam shells made a trip a minute grabbing from ten to twelve tons at each trip. Certainly no such dispatch has hitherto been obtained on the great lakes.

The steamer Augustus B. Wolvin arrived at Conneaut this week with 10,524 tons of ore which breaks her own previous record, and is only 363 tons short of the record made by the steamer E. H. Gary of the Pittsburg Steamship Co. of Cleveland.

No one knows when coal is going to begin to move. The shipments from Buffalo have been the lightest in years.

CHICAGO GRAIN REPORT

Chicago, July 25.—A further decrease in lake shipping during past week. The total movement lake and rail falling short of the previous week some half million bushels—and yet an excess of about 1,500,000 bu. over last year, when freights were dull at ⅞ to one cent per bushel.

Grain receipts from the west are giving a fairly good account; a total of wheat, corn and oats in past week some 3,572,000, with 4,026,000 previous week, against 2,570,000 bu. of year ago. It seems therefore that current prices, while suitable toward local marketing, are out of line with eastern and export shipping basis. July corn is working under strong speculative influences and perhaps the closing of this month may develop the required adjustment in prices toward cash business via lake routing. For the time being vessel supply is in excess of going cargo demand, and rates therefore easy at basis one cent corn to Buffalo and common points, with 3¾ cents through to Montreal.

The shipping of last week compiled by E. J. Fleming & Co., is distributed as follows: Via all rail lines of wheat 166,000 bu.; corn 246,000 bu., oats 830,000 bu.; via lake to Buffalo and other American points of wheat 30,000 bu., corn 1,250,000 bu., oats 169,000 bu. And to Canada points via lake, of corn, 271,000 bu., and oats 182,000 bu. Lake and rail shipping follows in usual order.

Lake and Rail Shipments—

	This week.	Last week.	Same week last year.
Wheat	228,131	151,083	108,050
Corn	1,703,074	2,142,083	1,183,885
Oats	1,181,053	1,233,196	724,888
Rye	4,580	3,278	5,882
Barley	30,514	16,833	20,866
	3,221,949	3,547,373	2,134,471

Lake and Rail Shipments since Jan. 1, 1905—

		Same time last year
Wheat	7,047,847	7,320,534
Corn	50,544,545	35,038,777
Oats	28,337,302	26,064,043
Rye	603,770	795,842
Barley	2,380,626	2,665,004
	88,914,090	71,044,200

Stocks in private and public elevators—

	This week.	Last week.	Same week last year.
Wheat	1,184,000	969,000	1,902,000
Corn	5,817,000	5,856,000	5,475,000
Oats	2,532,000	3,145,000	642,000
Rye	71,000	76,000	482,000
Barley	13,714	10,714	199,000
	9,617,714	10,056,714	8,790,000

FOR NEW LOCK AT SAULT STE. MARIE

In the report of Lieut.-Col. Charles E. L. B. Davis, United States engineer in charge of the deep waterway between Duluth, Chicago and Buffalo, recommendation is made for an appropriation of $3,300,000 to be spent on the St. Mary's Falls canal at the Sault. The bulk of this sum, $3,300,000, is for the proposed new lock. Other large appropriations are also asked to meet contracts and plans which Lieut.-Col. Davis had previously been given permission to make. The report, which was made public Monday morning, states that $600,000 will be needed to complete the work on the St. Mary's Falls canal in addition to the balance of $723,369.34 already on hand. This does not relate to the new lock which has not yet come before congress, but is simply intended to carry out the work already authorized. A million dollars is asked for the completion of the Hay Lake and Neebish channels, the amount on hand being $2,146,428.04. For the rest of the St. Mary's river, the balance of $93,797.22 is considered sufficient.

There is also plenty for the second canal at the St. Clair Flats, the diversion of $85,000 from the St. Mary's river appropriation having brought the total sum available for the project up to $293,139.71. For the Detroit river, however, $700,000 must be added to the $887,188.04 on hand to carry the existing work to its conclusion.

Lieut.-Col. Davis estimates that the maximum cost of constructing a 21-ft. channel from Lake Superior to Lake Huron would be $10,160,000, while to secure a uniform depth of 21 ft. in the Detroit river would involve an additional outlay of $2,000,000.

Contracts have been let to the Long Arm System Co. of Cleveland for installing its electrically operated bulkhead doors and hatch gears on the battleships Montana and South Carolina. The two vessels are now in course of construction by the Newport News Ship Building & Dry Dock Co. The navy department specifications for these warships provided that "each (power) door must be capable of permitting operation on the spot by power or by hand from either side, and all such doors are to be capable of being closed by power simultaneously from an emergency station." The Long Arm System is the only one that could meet these requirements.

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JULY 27, 1905.

Major J. C. Sanford, government engineer in charge of the work of dredging a 30-ft. ship channel in the Delaware river, has filed his annual report with the war department. A feature of this report deals with the work done by the government dredges, Cumberland, Burton and Gillespie. These dredges were built, as is well known, to do dredge work in competition with private contract work. Major Sanford's report indicates that the Cumberland dredged at a cost of eight cents per cubic yard, the Burton at a cost of seven cents per cubic yard, and the Gillespie at a cost of nine cents per cubic yard. It would be interesting to know how these figures were arrived at. They may represent the actual cost per cubic yard of removing the earth, but how about the interest on the original cost of the dredge, the cost of maintenance, replacement and repairs?

A very significant action was taken in Georgia last week when an agricultural committee recommended that Georgia's senators and representatives in congress assist in a movement for the upbuilding of the American merchant marine. There is more in this than appears on the surface. It shows that the great interest in shipping extends beyond the shipbuilder and shipowner. The real person interested is the producer, the shipper. Unless the avenues of transportation are kept open the oversea trade of the United States is some day likely to be stalled. At present as every one knows, the American export trade is entirely at the mercy of foreign ships. Scarcely more than 8 percent of our commerce is now going abroad in American bottoms. This condition will continue to exist so long as congress maintains the handicap which is now imposed on American shipping. It costs more by reason of the protective policy to build a ship in the United States than it does abroad, and by reason of this same policy it costs more to operate it after it is built. The American ship can never successfully compete in the foreign field until this discrimination is remedied in some manner. The bill which was drafted by the Merchant Marine Commission and endorsed at the last session of congress is about as reasonable a measure to bring this about as we have ever seen. It should be passed. This bill does not impose a direct tax on the treasury; it employs none of the public funds directly, but simply utilizes the dues levied against vessels and so disbursed that the American ship has the advantage.

In the recent explosion on board the gunboat Bennington in the harbor at San Diego, Cal., may be found plenty of food for reflection and serious consideration. Three score sailors lost their lives by reason of the explosion of a defective boiler. The department was aware of the condition of the boiler; temporary repairs had been made, but despite this fact the boiler was admittedly in an unsafe condition and those in charge of it had not permitted it to carry a full head of steam. This condition of affairs had existed for some time prior to the explosion. Steamboat inspection has been the subject of several searching investigations within the past year, brought about mainly by the burning of the passenger excursion steamer General Slocum in New York harbor. Since that time President Roosevelt ordered a special commission to investigate and report findings to him. Congress took up the matter and the board of supervising inspectors in annual session at Washington went over the matter with a fine tooth comb, raised a storm of protest from some vessel owners who contended the action of the board in ordering new equipment and making extremely stringent rules and regulations governing the operation of steamboats.

In several instances when steamers had not met the requirements at the time of the opening of their season the boats were not allowed to operate until after they had complied with the law in its strictest application. Naval officers were appointed in the various inspection districts to personally inspect the boats and see that local inspectors were performing their duties and that boats were properly equipped and up to the government

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standard. All reputable steamboat owners willingly met every suggestion of the government officials, realizing that by perfect equipment and government approval they secured the confidence of the traveling public and for themselves greater revenue.

Fines and suspension of licenses awaits the master or owner of a steamboat who knowingly operates his property when not in a safe condition. The government cannot reasonably expect to evade laws, or its servants escape penalties, made by its agents for individuals. Harsh as the criticism may on its face appear conditions seem to place those in charge of the Bennington in the position of the exponent of the gospel who told his hearers to do not as he did but as he directed.

As will be noted elsewhere in the news columns the semi-centennial celebration of the opening of the first canal at Sault Ste. Marie to commerce will take place next week. This event will go down in history and fifty years hence will be talked of. The celebration is one of great importance and will probably do as much as anything else to impress the nation with the position that this canal holds in the industrial life of the country. The first lock did service for more than thirty years and did its work creditably until the vessels grew too large to utilize it, the Weitzel and Poe locks succeeding. Great as they are, they are rapidly growing too small for the commerce that is crowding them, and another lock is required, and it should be of such dimensions as to forestall the needs of the immediate future. Big as the other locks were commerce overtook them before they were completed. The commerce on the great lakes has grown so prodigiously that the dream of one day is the reality of the next. No investment of the government has ever been made that has yielded such dividends as the money invested to improve the channels of the great lakes. The saving in freight, which must inure to the benefit of the whole people, is annually greater than the total amount expended by the government in deepening the channels of the lakes since navigation was established. Transportation on the great lakes has been brought to a refinement of economy, not known elsewhere, and has served as a leveler of rail rates wherever it has met them in competition.

IMPROVEMENT AT NEW YORK HARBOR

Lieut. Col. W. L. Marshall, of the corps of engineers, in charge of river and harbor work at New York, has submitted his annual report to the chief of engineers. It is stated that $1,998,206.75 has been expended on the improvement of New York harbor since 1884, when the first project was approved. As a result, Colonel Marshall says, channels to the sea have been made with a depth of 30 ft. at mean low water and a width of 1,000 ft. or more, and have been maintained for the full depth with as nearly as possible the full width. Further appropriations will be applied to the maintenance of those channels.

The work on Ambrose channel entrance to the harbor has so far cost $1,507,799.32. The available depth of the channel is 22 ft. at mean low water. Future appropriations will be applied to extending the channel westward and northwestward, the plan of operations being first to make the channel at least 35 ft. deep and of navigable width to provide passage for ships which cannot use the present channels at full draught. By the last appropriation act for rivers and harbors, the removal of the rock in the North river, near Pier 1, was authorized, and $45,000 was provided. A contract has been awarded to carry on this important work. Under an allotment from the appropriations for 1904 for emergencies, work has just been begun for restoring Coney Island channel to the depth excavated in 1900, 14 ft. at mean low water.

Col. Marshall reports that he cannot estimate the effect the project of improvement at New York will have on freight rates. It is said that the project for improving Buttermilk channel has so far cost the government $88,776.01. In the last fiscal year, which ended on June 30, the width of the north half of the channel was increased by 450 ft., and the south half was made 800 ft. wide. The available depth through the channel is 30 ft.

An important part of the engineer officer's report is the description of what has been accomplished at Governor's Island, where there is a project for enlargement. In the last year 45,943 tons of riprap were dumped in the bulkhead, extending out 559 ft., and completing it except a gap left for the scows bringing embankment material. About twelve acres of embankment were built above low water and about three acres above high water level. It is announced that 2,188 ft. of masonry sea wall have been built on the east bulkhead.

MONITOR WYOMING DAMAGED

On the morning of July 19 the United States monitor Wyoming met with an accident that will put her out of commission for some time to come and necessitate her being placed in the dry dock. While steaming along under full head of steam some thirty miles off Port Harford, on the southern coast of California, the monitor encountered a very strong head sea and a cross swell which heeled her over so abruptly that one of her propeller blades, and the shaft to which the propeller was attached, were broken in the same instant. The Wyoming is a twin screw. The plunging of the fractured shaft immediately wrought such havoc that the starboard engine was rendered useless before it could be stopped. For a few minutes quite a panic prevailed on board the vessel among the officers and men, until the cause was ascertained.

The Wyoming was at once put about and crept slowly into Port Harford—working the one screw that was not disabled. Her commander sent a telegram at once to San Francisco asking for a tug to bring the disabled war vessel up to the naval station. This was done and the monitor was placed in the dry dock at Mare island. She will be out of commission for some time as both a new shaft and propeller will be required.

By unanimous vote the general agricultural committee of the legislature of Georgia passed last week a resolution urging Georgia senators and representatives to do all in their power towards the upbuilding of the American merchant marine. The resolution cites the fact that in the upbuilding of American shipping lies the hope of extending the markets for American cotton, and it strongly endorses every movement which brings matters towards this desired end.

A steam schooner of 296 tons burden has been built at the Fulton Iron Works for the Nome trade. She is named Anvil and is owned by J. J. Session & Co. of San Francisco. She will carry a cargo of crude oil and general supplies and will ply between St. Michael, Nome and other Alaskan ports. She is equipped with two 150 H. P. gas engines and twin screws.

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AROUND THE GREAT LAKES

One of the most important harbor changes of recent years is be started Monday when the Milwaukee fog signal station, now on the end of the north harbor pier, will be removed to the south end of the outer breakwater. The work will be done by the government engineering force, under the supervision of Capt. W. V. Judson, the new officer in charge of the ninth lighthouse district. The change in the location of the fog signal is made for many reasons, the chief one being that in its new position it will carry much further to the northward and render unnecessary the establishment of another signal at Fox point. As soon as the work of concreting the north pier is completed the present beacon, where the fog signal now stands, will be moved about 600 ft. shoreward and will be replaced by another similar light. This will give navigators entering the harbor an additional light by which to determine their course. A fog bell, operated by clockwork, will also be placed on the end of the north pier. The signal when moved to the breakwater will be placed about 25 ft. north of the present beacon tower. It is thought that the work of moving it will not require more than a week. So many vessels have grounded near Fox point that a strong demand for a fog signal there has been made, but the removal of the present signal to the breakwater is expected to meet the requirements.

The board of army and navy engineer officers appointed to investigate wave action in certain harbors in Lake Michigan have filed their report with the chief of engineers and the information which it contains will not be transmitted out until presented to congress next December. The board consisted of Col. Wm. H. Bixby, of Chicago, Major Lansing H. Beach of Detroit and Major David Du B. Gaillard of Washington. The board is evidently of the opinion that the only way to eliminate all the harm which is now done by the waves at certain Lake Michigan ports is to build great breakwaters, but as some of these breakwaters would have to be constructed in very deep water, the project is not regarded as altogether practicable. The construction of cribs a short distance from the pier is suggested.

In the Gordon Campbell case, Judge Sanborn, of the district court of Milwaukee, has decided that by the general maritime law of England the master of a vessel, by virtue of his position as representative or agent of the owner, cannot establish a lien against the vessel for wages, although he may have a personal claim against the owner. A number of states have endeavored to extend the statute on lien right to the master of a vessel. Mr. William Frederick Carroll, who conducted the case, contended that no state law could extend this right because it was not recognized by the general admiralty law of the United States.

Three years ago the government steel dredge Wilfred, while on its maiden voyage, was lost in a storm between New Castle and Port Hope. A reward of $500 was offered by the Polson Iron Works for the locating of the lost dredge, but although the lake was searched the dredge was not located until last week, when W. W. Sparks discovered it in 78 ft. of water two and one-half miles from shore and about midway between New Castle and Port Hope. An attempt will now be made to raise the dredge.

The low-water mark for vessel property was reached at Chicago recently when the schooner H. A. Richmond, a two-masted vessel registering 189 tons, was sold at $6 to Benjamin Jacobson, by Alexander Anderson. The Richmond was built in Buffalo in 1861, and has not been in service for a couple of years. She will be converted into a barge and used for hauling cement around the Chicago river.

In his annual report, Major Charles L. Potter, government agent at Duluth, recommended the construction of a harbor of refuge at the lower end of Keweenaw canal. Major Potter says it could be provided for by simply enlarging the canal and the building of revetments.

Vessel owners are not looking with favor upon the transfer of Major Lansing H. Beach, who has been lighthouse engineer with headquarters at Detroit for the past four years. A petition is now being circulated in an effort to have him retained.

The steamer Neoshoto of the Gilchrist fleet, which was in collision with the steamer J. B. Nelson of the Pittsburg Steamship Co. last week, is badly damaged. It will take about four weeks to make repairs on her. The work will be done at Cleveland.

A. A. Schantz, general superintendent of the Detroit & Cleveland Steamboat Co., has for distribution a very pretty little story of Mackinac Island. It will be sent to any one on receipt of a two-cent stamp.

Capt. Harris W. Baker, wrecking master, has sold the partially burned iron steamer Iron Duke to the Hall Coal Co., Ogdensburg, N. Y. Capt. Baker raised the steamer at Charlotte last February.

The steamer W. E. Corey went into dry dock at South Chicago last week to have a couple of plates straightened.

TWO LAUNCHES ON AUGUST 5.

The steamer Peter White building at the Ecorse yard of the Great Lakes Engineering Works for the Cleveland Cliffs Iron Co., Cleveland, will be launched Aug. 5. This steamer, which is named after the Hon. Peter White of Michigan, is 524 ft. over all, 504 ft. keel, 34 ft. beam and 30 ft. deep and is equipped with triple expansion engines 23, 38 and 63 in. diameter by 42 in. stroke, supplied with steam from two Scotch boilers 14 ft. 9 in. by 12 ft. Her carrying capacity will be 9,000 tons.

The steamer Powell Stackhouse will be launched at the Wyandotte yard of the Detroit Ship Building Co. also on Aug. 5. The Stackhouse is building for the Mahoning Steamship Co. of Cleveland of which Dan Hanna of Cleveland is the leading spirit. The Stackhouse is 524 ft. over all, 504 ft. keel, 34 ft. beam and 30 ft. deep, and is equipped with triple expansion engines with cylinders 23, 38 and 63 in. diameter by 42 in. stroke, supplied with steam from two Scotch boilers 14 ft. 6 in. by 11 ft. 6 in. She will carry 9,000 tons of ore.

TURBINE STEAMER FOR MORGAN LINE

The Fore River Shipbuilding Co., Quincy, Mass., has, as indicated in last week's issue, closed contract with the Southern Pacific Ry. for a freight and passenger steamer for the Morgan line, to be fitted with twin screws Curtis marine turbines of the Fore River Co.'s manufacture. The boilers will be supplied by the Babcock & Wilcox Co.

The principal dimensions of the new steamer will be as follows:

Length over all	440	ft.	6 in.
Length between perpendiculars	415	"	8 "
Beam, moulded	53	"	
Depth moulded to upper deck at side	37	"	
Depth moulded to main deck at side	29	"	
Depth moulded to lower deck at side	20	"	3 in.
Height between saloon deck and upper deck	7	"	9 "
Height between promenade deck and saloon	7	"	6 "
Height between saloon deck and boat deck	7	"	6 "
Length of the amidship superstructure, about	182	"	

Displacement, loaded, about 10,000 tons.

The Portland Shipbuilding Co., Portland, Me., are to build a new tow boat for the Boston Tow Boat Co.

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MAJ. CHARLES L. POTTER'S REPORT

Major Charles L. Potter in charge of the harbor work on Lake Superior has just forwarded his report for the fiscal year to Washington. In it he shows the amount of money spent at Duluth-Superior since 1867 to amount to less than one-quarter of one percent of the value of the freight handled at the head of the lakes. In his report on the Superior and Duluth harbor Major Potter says:

"The present project provides for the deepening and widening to a navigable depth of 20 ft. existing channels in Allouez bay and St. Louis river, for extensive turning and anchorage basins of a navigable depth, for the widening of the Wisconsin entry and finishing it off with concrete superstructure. The estimated cost of the work in Duluth and Superior which has been done was $3,130,553, but this referred only to the deepening of the channels and basins by dredging. This has been done at a much less cost, permitting the purchase of lands to the extent of $106,561.19. The rebuilding of the Duluth canal piers cost more than $650,000, including the price of the land, leaving a balance of $275,000 toward the building of the piers at the Wisconsin entrance now in the course of construction. The amount expended on existing projects to the close of the fiscal year ending June 30, 1905, exclusive of outstanding liabilities, was $3,283,331.14, of which $275,000 was expended for maintenance.

"The construction of an engineer building on the government land north of the canal will be carried out during the present season and the coming winter at a probable cost of $20,000, and will be occupied in the neighborhood of May 1, 1906. The present leased quarters, for which an annual rental of $1,200 is paid, will then be given up. The parking of the canal grounds will follow the construction of the engineer building. The piers at the Wisconsin entry were placed thirty-two years ago in water of an average depth of 8 to 10 ft., the object being to secure a depth of 12 ft. in the channel. With the growth of commerce the channel depth has been increased to 24 ft. and the crib bottom is now many feet above the bottom of the channel. Considerable displacements have resulted and the present piers are to be replaced by new ones of a novel design of concrete construction from 21 ft. below water to 10 ft. above.

"The work on these piers was begun in the spring of 1903 and is still in progress. Part of the work was completed last season. For the present season the construction has been interrupted for the time being by the loss of a protection dike in the severe storm of last spring, necessitating the building of a more substantial breakwater. It is expected that the laying of the concrete will be resumed later in the season. The estimated cost of this work is $925,000.

"The total amount of money expended by the government on this harbor since 1867 is over $4,831,514.14. The vessel freight received and shipped at this port during the same period was 155,547,091 tons, and its market value is estimated at $2,144,089,079. From this it is seen that the cost of the government improvements has been less than a quarter of one percent of the value of the freight handled at this port.

"It has been estimated that the entire saving in freight rates on Lake Superior commerce during a single year is within $5,000,000 of the entire amount appropriated by the United States on the lakes above Niagara Falls for the formation of government works. If the commerce of Lake Michigan and Lake Erie be included in the annual saving the latter will greatly exceed the amount thus appropriated.

"The small ratio in the cost of improvements to the saving effected is, of course, largely due to the fact that the great lakes form a natural waterway in which artificial improvements comprise only a small part of the entire length."

Percy & Small, Bath, Me., are building a 3,000-ton schooner for the Wm. F. Palmer fleet.

STEEL CORPORATION'S SHARE OF ORE

The Bulletin of the American Iron and Steel association publishes a table in which the percentage of the total shipments of iron ore from the Lake Superior region by the United States Steel Corporation as compared with the shipments of iron ore from the same region by all other companies, firms and individuals, and the percentage of the total production of iron ore, coke, pig iron, steel ingots and castings, finished rolled iron and steel and wire nails by the steel corporation and by all independent producers, both for the years 1902, 1903 and 1904 are given. In the three years covered by the table production of iron ore by the steel corporation fell from 45.1 percent of the total in 1902 to 43.8 percent in 1903, and to 38 percent in 1904. The considerable decrease in 1904 was due principally to the large stock of iron ore carried over from 1903. The production of Bessemer steel rails by the corporation declined from 65.4 percent in 1902 to 57.2 in 1904. The decrease in the latter year was caused mainly by the competition of the Lackawanna Steel Company, an independent concern which was an active competitor for Bessemer rails in 1904, its new plant having at that time only recently been put in operation. The increased production of open hearth steel rails from southern rail mills also influenced the result. The production of the steel corporation also shows a decrease of 3 percent during the three years in the total of all kinds of finished iron and steel, including rails. The table for 1904 follows:

Percentage of Shipments and Production by the United States Steel Corporation and by Independent Producers.

	1904	
	U. S. Steel Corporation.	Independents.
Shipments of iron ore from Lake Superior	53.8	46.2
Total products of iron ore	38.0	62.0
Production of coke	36.6	63.4
Bessemer, basic, forge, foundry; all other pig iron	44.3	55.7
Spiegeleisen, ferro-manganese and ferro-phosphorus	70.5	29.5
Total pig iron, including spiegeleisen, etc.	44.6	55.4
Bessemer steel ingots and castings	69.0	31.0
Open-hearth steel ingots and castings	59.4	40.6
Total steel ingots and castings	61.0	39.0
Bessemer steel rails	57.2	42.8
Structural shapes	55.1	44.9
Plates and sheets, excluding nail plate	58.0	42.0
Wire rods	71.3	28.7
Bars, skelp, nail plate, open-hearth, iron rails, etc	28.6	71.4
Total of all finished rolled products	47.8	52.2
Wire nails	67.0	33.0

SPECIAL RATES TO SAULT STE. MARIE

On account of the semi-centennial celebration at Sault Ste. Marie, The Michigan Central Railroad Co. has made a rate of $11.18 for the round trip from Detroit to Sault Ste. Marie. Correspondingly low rates will be made from all points in Michigan. Tickets will be sold July 31 and August 1, good for return until August 5. The Michigan Central has through sleeping cars, leaving Detroit at 8.55 p. m. to the Sault and also direct connections at Mackinaw City with the Northern Peninsula special, leaving Detroit at 7.05 a. m. The celebration at Sault Ste. Marie will be one of great importance and will be attended by thousands.

The three-masted schooner Helvetia was launched from the yard of S. L. Snow & Co., Rockland, Me., last week. This vessel has been on the stocks for two years. She is 157 ft. long, 32 ft. beam and 12 ft. deep.

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AS BUFFALO VIEWS IT

Buffalo, July 25.—Railroad men, taken singly and unofficially, seem to be quite as ready to see a great future for water transportation as any one, and they can give good reasons for their faith. I asked the manager of a well-known coal road in Pennsylvania the other day how the canalizing of Allegheny river was progressing and he said that it was going on finely and was promising to be successful enough from a commercial standpoint to push the work far up the river. He thought it would become a slack-water way well up into New York state before the work was stopped, in fact just as far as the idea was practicable from an engineering standpoint.

And besides, he added, there is before long to be a canal direct from Lake Erie to the Ohio, which everybody now seems to consider a certainty. The best of it all was that the railroad man spoke of these and other waterway enterprises with enthusiasm and not with apprehension, as one would do who was afraid the return to water carrying inland would cut down the earnings of the railroads. Of course the lake system forms the great object lesson in this sort of commerce and it is proving its worth more and more every day.

Last week was a large week for the men who load coal into lake vessels from the Lackawanna trestle at the mouth of Buffalo river. One day the score ran up to within a small amount of 12,000 tons. This has been done before, with only 40 working pockets to pass the coal through. This means the bringing in and elevation to the top of the trestle of about 300 cars of coal and a few years ago it would have meant many more cars. To the through-line coal business it means something that land transportation can never hope to meet, for a great part of this coal was shipped to Duluth and Superior, paying to the vessel 30 cents a ton for the 1,000 miles of transportation. This has been the regular rate for a long time and it is not disputed that the vessel makes a profit on the business.

Somebody has compared rail transportation in this class, as compared to lake transportation, and spoken of it as working with a spoon, but even that does not suggest the full contrast, for the coal that now goes to the head of Lake Superior by water would never get there by rail at all in any such amount as it goes now, and the little that did get there would be regarded a luxury and sold to the well-to-do only. It would be cheaper to return to burning corn than to use hard coal carried so far by rail.

Our railroad authority sums up the changes about to take place in transportation as due to the fact that the strides lately made in railroading have about reached their limit and yet the need of more facilities is as great as it was 20 years ago. Moreover this need is to increase for a long time yet. What, then, is to be done? Plainly there is nothing left but to return to water transportation inland. The next great object lesson in that line is, of course, the turning of the Erie canal into a 1,000-ton barge waterway, and when the benefits from that are a fact, even if half of what has been looked for is accomplished, there will be a great turning to the same sort of thing all over the country wherever such improvement is possible.

There is so much need of relieving the railroads of the carrying of coarse and imperishable commodities and giving them the opportunity of working out to the full the speed problem that they should offer no possible opposition to waterway extension. Besides canals have always so added to the growth of sections traversed by them that the railroads paralleling them were great beneficiaries on that account. The New York Central railroad appreciates that fact and some of its highest officials are advocates of the 1,000-ton barge canal. On the other hand the Erie railroad is the most persistent enemy of canal enlargement. This road is considerably the more direct way to New York from Buffalo, and yet how little has it been able to profit by the fact! It has no canal to fill the route with towns.

The local papers are mentioning our State Senator Hill as coming back from a trip to Europe more than ever enthusiastic over the canal question. He found German authorities expressing themselves as jealous of the advancement we are going to gain by the enlarged Erie canal. And yet we were about to throw it away and indeed we have already thrown away most of our minor canals. This country is so fertile in resource that what we waste is wealth to the older part of the world. The Chinaman, getting rich out of our refuse from the quartz mill is not the only example of his sort.

But we are fortunately getting awake to the needs of some of this side-tracked wealth, and we are going to make use of it as fast as we can. The inland waterway wealth is one of these and it is not going to be neglected till too late. JOHN CHAMBERLIN.

The Thermit Process in American Practice.

CONTINUED FROM PAGE 33

through the rate war and the invasion of what it believed to be its special territory by the Cunard Steamship Co. The net result of the year is that the combination has failed to meet its interest charge by $2,039,150. By counting in the surplus insurance account this deficit was reduced to $1,149,098. In 1903 the operations of the company showed a surplus of $355,295 after paying interest charges, and by including the surplus insurance account of $1,442,502 there was a final reserve of $1,797,797.

Following is the income account for the fiscal year ending Dec. 31 compared with the previous year:

	1905	1904	Decrease
Gross voyage earn.	$27,926,008	$29,677,756	$1,750,848
Miscel. earnings	920,085	1,359,604	439,579
Total	$28,846,093	$31,037,420	$2,190,427
Gross expenses	27,040,586	27,036,898	*3,688
Net earnings	$1,806,407	$4,000,522	$2,194,115
Charges—			
Interest on bonds	$3,312,151	$3,083,346	*$228,805
Interest on loans	469,283	441,218	*28,065
English income tax	64,123	120,663	56,540
Total	$3,845,557	$3,645,227	*$200,330
Deficit for year	2,039,150	†355,295	*2,394,445
Surp. insur. acct.	897,052	1,442,502	545,450
Final deficit	$1,142,098	†$1,797,797	*$2,939,895

The retiring board of directors was re-elected.

President T. Bruce Ismay ascribes the poor showing made by the company largely to the continued depression in freight rates on the North Atlantic during the latter part of 1904. While passenger traffic has been large, the company's ships (carrying to and from all European and American ports 26.51 percent of the whole), earnings were seriously affected by the all-around cut in passenger rates. On this point President Ismay says:

"This unfortunate situation was occasioned through the unexpected establishment by the Cunard line of a new service to the Continent, which seriously menaced the business of the Continental lines. The latter, in reprisal, made a counter attack upon the Cunard's Company's British and Scandinavian

*Increase. †Surplus.

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business, which left your company no alternative but to make corresponding reductions in rates in order to maintain its position in the trade. Your company has earnestly endeavored to use its good offices to effect a reconciliation among the various interests concerned, but so far, although rates have been restored to a more remunerative basis, no permanent agreement has yet been reached. It is hoped, however, that wiser counsels will prevail, and that any differences may be adjusted by reasonable concessions without recourse to the unfortunate methods lately adopted, which have only resulted in loss to all concerned."

President Ismay makes this indirect reference to the decline in the company's securities:

"Inasmuch as the securities of your company are so largely held abroad as well as in America, the international character, which it consequently bears, should be an important factor in bringing about a better understanding among the great steamship companies engaged in the North Atlantic trade."

He concludes with the statement that the outlook for the year 1905 is more favorable; the forecast of earnings for the first six months of the year, indicating a large gain over the corresponding period, not only of the year 1904, but of the year 1903 as well.

NO MORE SHIPS UNDER AMERICAN FLAG

Mr. James J. Hill of the Great Northern railway in a recent interview said that the United States is not making the best of its great natural resources.

"Individual effort is restrained by political theorists and demagogue leaders," said he. "Compare our efforts with those of Germany. There the Emperor himself is at the head, guiding and fostering commercial development. We are falling behind in the procession, and five or ten years hence this country will deplore the present policy of political interference locally and nationally. We are dillydallying with South American trade and are trying to build the Panama canal. What good will come of it? We have not the ships, and freight rates to the east are against it. We have not the protecting laws for a merchant marine. I myself have recognized that condition and shall certainly never again build a ship under the American flag. Ships can be built cheaper abroad and operated more successfully, from a commercial point of view, under a foreign flag. There are too many hampering influences on commerce from governmental and individual quarters."

Mr. Hill discussed the markets in the east, declaring that wealth and commercial supremacy came from the sale of products to foreign countries, and that our merchants and manufacturers were faring badly in competition with other leading commercial nations, which he attributed to restrictive governmental and individual influence and negligence of our manufacturers and merchants. On these points Mr. Hill said:

"Last year the south raised a bumper crop of cotton, some say 13,000,000 bales, and others more. The year before there was a crop failure, when less than 10,000,000 bales was raised in the cotton belt. Yet the crop gathered in the failure year netted the southern planter $150,000,000 more than the record breaking crop of 1904. Why is that? Simply because we had not developed our own markets. The great east, with its millions of people, ready to take our goods, particularly the cotton goods, are shunned and tabooed to such an extent that they are cooperating against and boycotting American wares. I do not want to appear pessimistic, but I would like to see more aggressiveness on the part of our merchants and some fostering care which a national government ought to give to its commerce. Let us have more common sense and business-like methods in our national administration. Let there be a business awakening. If there is not it will be found that, self-satisfied as we are now, we will fall behind in the procession. What is needed the country over is a great awakening; a sort of revival in its business methods and domestic and foreign trade, and a different and higher commercial standard or moral tone. This great awakening will have to come before we are a world power."

SHIPBUILDING IN THE UNITED KINGDOM

From the returns compiled by Lloyds Register of Shipping, it appears that, excluding warships, there were 472 vessels of 1,301,457 tons gross under construction in the United Kingdom at the close of the quarter ended June 30, 1905. The particulars of the vessels in question are as follows, similar details being given for the corresponding period in 1904 for the purpose of comparison:

DESCRIPTION.	June 30, 1905.		June 30, 1904.	
	No.	Gross Tonnage.	No.	Gross Tonnage.
STEAM.				
Steel	440	1,296,066	355	982,644
Iron	1	320	4	704
Wood and Composite	1	220	2	310
Total	442	1,296,606	361	983,658
SAIL.				
Steel	18	3,591	15	7,730
Iron	....	....	....	....
Wood and Composite	12	1,260	16	1,700
Total	30	4,851	31	9,430
Total Steam and Sail	472	1,301,457	392	993,088

The tonnage under construction at the end of March was about 202,000 tons more than at the end of December, 1904. The present quarter's total shows a further increase of 50,000 tons. Compared, however, with the total reached in September, 1901, which is the highest on record, the present figures still show a reduction of about 111,000 tons. Of the vessels under construction in the United Kingdom at the end of June, 374 of 994,802 tons are under the supervision of the Surveyors of Lloyds Register with a view to classification by this society. In addition forty-five vessels of 128,876 tons are building abroad with a view to classification. The total building at the present time under the supervision of Lloyds Register is, thus, 419 vessels of 1,123,678 tons.

STEAMER TEXAN TO BE AN OIL BURNER

The American-Hawaiian Steamship Co.'s freight carrier Texan arrived recently at San Francisco after calling at Coronel for coal and at San Diego to discharge some cargo. She brought about 8,000 tons of general freight to San Francisco. On her return to New York she will be converted into an oil burning vessel, after which she will save the time consumed in filling her coal bunkers at Coronel. The Texan has been one of the most successful vessels owned by the company, and, with oil as fuel, will be operated more economically. The steamers Alameda and Mariposa, running between San Francisco, Honolulu and Tahiti, were the first ocean liners to burn oil. The results have been highly satisfactory.

The Marine Railway, Machine & Boiler Works, Baltimore, has nearly completed the machinery for a new steamer to be employed in the freight and passenger trade between Whitestone and Urbana on the Rappahannock river. The machinery wil consist of triple expansion engine with cylinders 6, 10 and 16 in. diameter and 10-in. stroke.

The freight ship San Mateo, formerly under charter to the Pacific Mail Steamship Co., will be put into commission under the flag of Goodall, Perkins & Co., the well-known San Francisco firm, and will run in connection with the steamer M. F. Plant.

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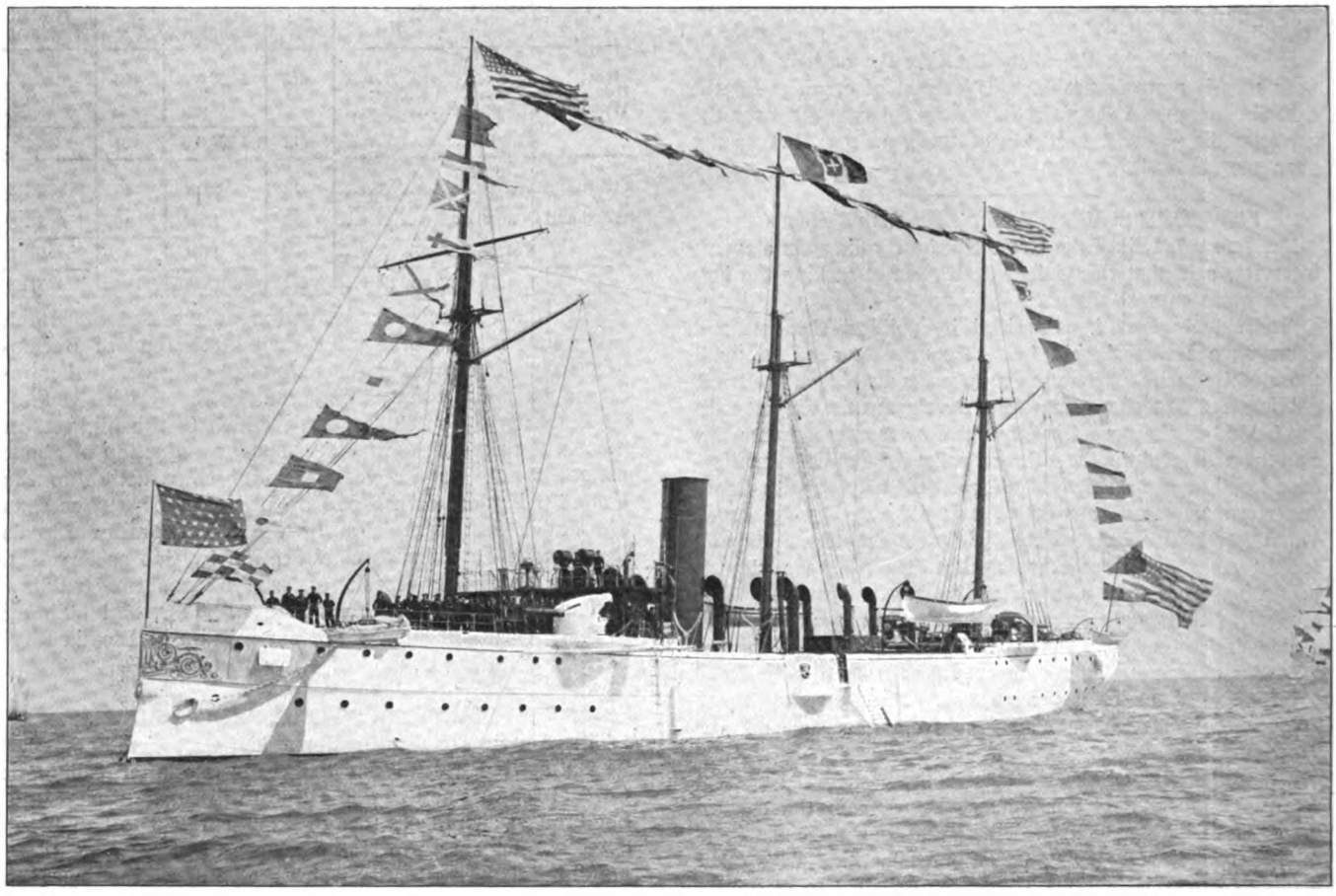
BENNINGTON'S BOILERS BURST

The gunboat Bennington blew up in San Diego harbor last week by the bursting of her boilers, killing twenty-eight members of her crew and injuring nearly 100 seamen. There were 250 men aboard at the time and many of them were hurled into the sea. The Bennington at the time of the accident had full steam up, having been ordered to convoy the disabled Monitor Wyoming to the navy yard at San Francisco. Capt. Wentworth, commander of the ship, happened to be on shore at the time and was looking at the Bennington at the precise moment when the disaster occurred. He says he saw human bodies hurled over 100 ft. upward. When he reached the Bennington she presented a frightful appearance. The force of the explosion had blown a great hole in the starboard portion of the ship and the section of the upper deck was carried away from stem to stern. It appears that the boiler, which exploded, was considered unsafe, and had been kept under reduced pressure for some time. The Bennington was built by N. F. Palmer & Co., Chester, Pa., and was launched in 1890. She is 230 ft. on the water line, 36 ft. beam and 14 ft. draught.

The Bennington had four cylindrical straightway boilers, commonly called locomotive gunboat boilers. Each boiler was 17 ft. 9 in. long and 9 ft. 9 in. in diameter. They were originally designed to carry 160 lb. of steam, but the last log received at the department shows that the safety valves were set for 145 lb., and that she carried from 135 to 140 lb. of steam in cruising. One of the strong claims of her builders was the total absence of "priming" in her boilers on her trial trip. The tendency of most boilers is for the steam to take up water and carry it into the steam pipes and cylinders. The engineers of the Bennington always commented on "the unusual dryness" of the steam.

The Bennington was designed chiefly to be a commerce destroyer in case of war, while her draught, averaging only 14 ft., gave her access to many ports not open to larger ships. She was always a wonderfully steady ship, and this is her first serious mishap. Her boilers were fifteen years old, according to records in the department, but were retubed in 1903-'04. The rear admiral in command of the Pacific fleet in 1904 reported to the navy department that the boilers were in need of repairs, but that the repairs were not urgent. A report from the engineer officer of the ship received at the department about the same time was that the boilers generally were in poor condition, but that the internal condition of the boilers was good. A detailed report on the condition of the boilers was received by the department last March. In May last the Bennington was sent to the Mare Island yard, when temporary repairs were made on her boilers to put her in cruising condition. It is stated at the Bureau of Steam Engineering that there has been nothing in the reports coming to the department to show that the boilers were in an unsafe condition.



GUNBOAT BENNINGTON

As soon as the news of the explosion reached the Steam Engineering Bureau all the records and reports relating to the Bennington were reviewed by Rear Admiral Rae, chief of the bureau, and later he called on acting secretary Darling, when he advised him fully of all the facts pertaining to the boilers of the ill-fated ship. The acting secretary made the following statement relative to the disaster:

"The department has learned with the deepest regret of the disaster which overtook the gunboat Bennington.

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Nothing unusual has been reported to the department with respect to the boilers in the Bennington. A detailed report on the condition of the boilers was made in March last, and repairs were made in the following May. The boilers on the ships of our navy are receiving constant attention and are constantly under the supervision as well as the inspection of engineers."

THE SUEZ CANAL

The Suez waterway is a fraction under a hundred miles in length, and cost approximately $100,000,000. The difficulties encountered in its building were not those to be dealt with by engineering skill; and De Lesseps was ever face to face with financial and political obstacles that taxed his resources as negotiator and diplomatist. The canal was in no sense an engineering achievement; the isthmus of sand, washed by seas of identical levels, was pierced by the crudest form of labor, practically unassisted by machinery. Excavators and dredgers of the character employed on the Chicago drainage canal could duplicate the Suez cutting for $25,000,000, experts insist. Thirteen years after the Suez concession was granted the canal was opened to traffic—on March 18, 1869—and, strange augury, the first vessel to pay toll flew the British ensign.

The canal's value to commerce is sufficiently proven by the shortening of distances, compared with the old route around the Cape of Good Hope. By the latter the distance between England and Bombay is 10,860 miles, by the canal 4,620 miles; from St. Petersburg to Bombay by the Cape is 11,610 miles, and by the canal 6,770 miles; and from New York to Bombay by the Cape route the distance is 11,520 miles, while by the canal it is 7,920 miles. How rapidly the traffic attracted by economy of distance and time thus effected has developed, the following statistics, taken quinquennially from the Suez company returns, show:

Year	Steamers	Tonnage	Receipts in francs
1871	765	761,467	7,595,385
1876	1,457	2,096,771	27,631,455
1881	2,727	4,136,779	47,193,880
1886	3,100	5,767,655	54,771,075
1891	4,206	8,669,020	83,421,500
1896	3,407	8,594,307	79,652,175
1901	3,699	10,823,840	100,386,397

Some readers may be surprised to learn that the current use of the Suez canal averages ten ships daily. Ten or twelve years ago, 75 percent of the vessels passing the canal were under the British flag; but in recent years there has been a gradual falling off in the number of English ships, due chiefly to the systematic effort that Germany is making to develop new markets in the Far East and in Australasia. But the British flag still represents two-thirds of the traffic. Next to England, Germany is the principal user; the Dutch flag comes third, while the tricolor of France is fourth in the list. Not for many years have the Stars and Stripes been seen in the canal over a commercial vessel, yet cargoes to or from the United States employ the canal frequently, nearly always in British bottoms. A few warships and transports going to or returning from the Philippines and two or three yachts usually comprise the annual volume of American representation.

The economy in using the canal is effected through saving of time. The present toll is $1.70 on vessel tonnage, and $2 for every passenger, not counting ship's crew. Since electric lights for night steaming came into use, it requires from 14 to 18 consecutive hours to make the passage from entrance to exit. The tariff for a large steamer, a liner of the Peninsular & Oriental Co., or a troop-ship filled with soldiers, is not infrequently $10,000. The gross revenue nowadays is slightly in excess of 20 percent on the capitalization and net earnings about 11 percent, figures indicating remarkable prosperity and explaining the popularity in which Suez securities are regarded by investors.—[F. C. Penfield in "North American Review."

CONTRACT WITH PANAMA RAILROAD CO.

The contract between the Panama Railroad Co. and the Pacic Mail Steamship Co., giving the latter the privilege of handling freight exclusively on the Pacific side on through bills of lading, terminated July 12. All carriers will now be on an equality with regard to transit over the Isthmus of Panama. In reference to this matter Mr. R. P. Schwerin, general manager of the Pacific Mail Steamship Co., said: "We shall continue the present service to protect the merchants of San Francisco. But whether the vessels will be run permanently depends on the volume of business between San Francisco and Ancon, the port at the Isthmus. If the Isthmus is thrown open and South American companies extend their service to San Francisco or Puget Sound and British Columbia under the subsidy offered by the Dominion government, ship for ship it would be impossible for the P. M. S. S. Co. to carry freight and passengers in competition with them and live. The Isthmus and local business would be moved by the P. M. S. S. Co. (American), the Kosmos (German), the Pacific Steam Navigation Co. (British), and the South American De Vapores (Chilian). There cannot be business for four lines and, with the closest economy of operation, the American line cannot compete with its foreign competitors on account of the higher cost of its operating expenses.

"But, if the business is withheld from ships sailing under foreign flags and is open to all ships under the American flag, the Pacific Mail S. S. Co. will maintain its line, substituting as fast as possible American vessels of modern construction which would form a line to operate through the Panama canal when completed."

NEW LIGHT HOUSE IN THE BAY OF SAN FRANCISCO

The new light-house on Mile Rock, in the Bay of San Francisco, will probably be finished about the end of September. Early in July the Hornby-Akroyd compressed air engines were placed in position and the structural workmen were engaged on the lantern. The plans for the light-house (which is one of the most difficult undertakings of its kind on the Pacific Coast) originated with Col. Thomas H. Handbury, chief of the twelfth light-house district. The cement foundation, 35 ft. 6 in. long and 21 ft. wide, is covered with steel; it is 34 ft. high and contains entrance, stairways and a tank for fresh water. Above is a four-storied steel tower, the first story being 32 ft. 6 in. by 18 ft. and containing the machinery; the next story being circular, 18 ft. in diameter, containing the kitchen; the third story being devoted to living apartments and the fourth to a watch room. In the top of the steel tower is the lantern, containing a light of the third order, 84 ft. above mean tide. The light-house will be equipped with hoisting machinery and connected by telephone with the shore.

The light-house is about 1½ miles east of a line drawn across the entrance to the bay and ⅜ of a mile from Point Lobos. The situation is a very exposed one, strong currents running and winds blowing round the rock. Even during the summer season the workmen have on some occasions been unable to reach shore when their day's work was done and have been obliged to spend the night on the rock.

In the first half of July the following vessels of the Standard Oil Co. were in San Francisco Bay: The steamers Dakotah, George Loomis, Asuncion and Atlas, barge 93, the ship Astral and the Appalachee, which was formerly the British steamer Duffield. The Appalachee is about 2,500 tons, with engines placed far aft. She is equipped to carry oil in bulk. She is operated by the English branch of the Standard Oil Co. and flies the British flag.

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THE THERMIT PROCESS IN AMERICAN PRACTICE*

Just a year ago the first thermit was manufactured in this country and the applications developed in Europe by Dr. Hans Goldschmidt, at the works of Th. Goldschmidt, Essen-Ruhr (founded 1847), were transplanted to American soil and have since blossomed forth under the fostering care of American ingenuity. The principle of the thermit process can now be said to be known to the technical world, and it will be sufficient to state that through the ignition of finely divided aluminum and metallic oxide, a reaction is started which produces heat of about 5,400° F. and at the same time reduces the iron oxide to a metallic iron almost free from carbon, in a highly superheated liquid state. Thermit steel has practically twice the temperature of open-hearth steel and a corresponding greater fluidity. By suitable additions of carbon, in the form of steel punchings, chilled iron shot of ferro-silicon, its hardness, and by addition of manganese, its toughness can be increased to any suitable degree.

The following analyses will confirm this. The first is one of pure thermit steel; the other of the steel in the riser of a welded steel locomotive frame, drawn out under the hammer into a bar some three feet long and turned down and broken:

ANALYSIS OF THERMIT STEEL.

Illinois Steel Co., The Rookery, Chicago, Ill.

Carbon	Manganese	Silicon	Sulphur	Phosphorus	Aluminum
0.05.	0.10	0.204	0.04	0.05	0.18

Tensile Strength, lbs. per sq. in.	Elongation.	Contraction of area.
59,320	25.33 percent	59.6 percent

PENNSYLVANIA RAILROAD, ALTOONA.

Thermit Steel with Addition of 2 Percent Carbonless Manganese 5 Percent Iron Punchings.
(Calculated on Amount of Thermit.)

Carbon	Manganese	Silicon	Sulphur	Phosphorus	Aluminum
0.102	2.330	1.227	0.034	0.070	.....

Tensile Strength, lbs. per sq. in.	Elongation percent in 8 in.	Appearance of Fracture.
91,600	21.5	Silky.

The simplicity of outfit and manipulation and the speed with which the reaction does its work are its chief recommendations for industrial purposes. In a crucible some 20 in. high and therefore easily transportable, in half a minute can be produced 30 lbs. of liquid steel, so hot that it will melt a steel bar of 4 square section and fuse with it to one homogeneous mass. The essential characteristic of thermit is that it welds by fusion, and by reason of this fact, calls for the foundryman's experience more than blacksmith's. Its success depends on the proper material, shape and condition of the mold. The mold into which the contents of the crucible are run must be of refractory material. The general instruction must of course be broad and cannot go beyond stating that a mixture of equal parts of sharp sand and ordinary brickmakers' clay has given satisfaction. The formula has been varied sometimes, according to local conditions, in some cases flour, in the proportion of 6 to 100, being used as binder for the sand. Some shops have already evolved their own particular formulas, which they treat as secret. The mold always must be dry—burnt dry. In some cases, for instance, at the Elkhart shops of the Lake Shore & Michigan Southern, the difficulty has been overcome by using fire-brick cut down to size. This certainly overcomes the question of drying molds.

The shape of the mold must next be considered. It must be so constructed that the steel flowing down through the gate will not strike direct on to the casting or forging, but will flow underneath the lowest part and rise around and through it. What is required is good circulation for the thermit steel. It must flow around all the welding surfaces and as it gets chilled in contact with these, it must be driven up into a riser and be followed by a sufficient supply of fully heated thermit steel to effect the actual weld, which takes the shape of a collar or reinforcement, cast on or over the fracture. The mold must therefore allow (1) for a gate, (2) for a collar, shoe or other reinforcement on the surface of the welded piece and over-lapping the edges of the break or joint, (3) a riser, (4) a skim gate, to prevent the slag from getting mixed with the steel. The formula for calculating the amount of thermit must also allow not only for the cubic space of this reinforcement, but further, for again as much thermit, to supply the contents of gate and riser.

These are the general instructions for welding, for instance, locomotive frames—a problem which some 30 railroads in this country have investigated with more or less success. These frames are of wrought iron or cast steel and vary from 3½ x 3½ to 5 x 6 in. in section. They are very liable to break and their repair without dismantling the engine means a very large saving per engine. It has been stated that an engine, the frame of which is repaired in the forge, remains a fortnight out of commission and the actual weld cost $250 to $300. The work by thermit can be done comfortably in three or four days, at a cost of about $50.

In reply to a circular letter of inquiry, about twenty railroads have supplied data, which, however, cannot be considered complete, as some of the most regular and extensive users of thermit did not care to supply the information asked for. The first successful weld it has been possible to get a record of was made by Mr. Sanderson, superintendent motive power, Seaboard Air Line, on Oct. 19, 1904. This engine has continued in service ever since. It is one of eight engines welded on that road which have given satisfaction, which speaks highly for the care used at the Portsmouth shops in handling a new and therefore difficult problem. Another series of successful welds is reported by the Boston & Albany Line, where Mr. Fries welded five engines quite successfully—one being in continuous service since the end of November. One, welded in the jaw, broke again, but 4 in. away from the weld. Of late the Lake Shore & Michigan Southern has shown great interest, and its perseverance has been crowned by success in some very good welds at their Elkhart shops, about which Mr. Webb read a very interesting paper at the last annual meeting of the American Foundrymen's association, giving a full account of each step in the operation. On a preliminary test, a welded bar 2½ x 2¾ stood a pressure of 50 tons on supports 20 in. apart, before breaking, and that, after two sides of the reinforcing collar had been machined off.

In all there are records of thirty engines with welded frames that have been in service for three months or longer. Failures are recorded only in isolated instances and are assignable to three different reasons:

First, wrong construction of mold.

Secondly, insufficient thermit; in other words, insufficient circulation—therefore, insufficient fusion.

For those familiar with the process, a weld that breaks on account of lack of cohesion at the welding surface is attributable under all circumstances to lack of experience or care, except in one particular case.

It is possible for thermit welded frames to break in spite of proper execution of the work. The original break is due, in the first place, to a structural defect. With the break in such a position as to necessitate the entire removal of the reinforcing collar, it is too much to expect the mere bridging of the broken ends by thermit steel to overcome this innate weakness.

An important factor in success in welding locomotive frames is to allow for equal shrinkage of parallel parts; also, wherever possible, to spread the ends apart in order to let them come back when the iron begins to set.

Another operation of interest to railroad men is the welding of spokes of drivers. In making tests of the metal of such

*Paper read at the annual meeting of the American Society for Testing Materials, Atlantic City, N. J., June 29-July, 1905, by Ernest Stutz.

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welds, the Chicago, Milwaukee & St. Paul R. R. found a tensile strength of 93,900 lbs. per sq. in. The analysis agreed with that of the Pennsylvania railroad, with the exception of manganese, which in this case was only 0.74.

Next came repairs in marine engineering, which are mostly successes obtained by Mr. Des Anges, superintendent floating equipment of the Long Island Railroad. A 12-in. crank shaft (13⅝ in. at point of fracture) of the ferry-boat "Manhattan Beach" was welded with 400 lbs. of thermit. The break was in the "wheel center," necessitating the shifting of the center to a new position and shortening the paddle boxes. The shaft was pre-heated by a charcoal fire and hand-blower, to black heat. To protect the woodwork of the ferry-boat, an asbestos curtain was hung around the crucible, which served its purpose admirably. The ferry-boat has been in uninterrupted service for nearly three months, and continues so now. A rudder-stock, 5 in. in diameter, was welded with 50 lbs. of thermit and 10 lbs. of punchings. The collar in this case had to be entirely removed, but the welded rudder-stock has now been in service for eight months.

On the great lakes, through the enterprise of Capt. Johnson, at that time with the Dunham Towing & Wrecking Co., the rudder shoe of the tug boat Schenck was welded, 125 lbs. of thermit being used. The weld was sound—in replacing the propeller, a chain broke and the propeller dropped on the welded shoe without injuring it.

Some important repairs of gray iron castings are also reported. At the Renovo shops of the Pennsylvania railroad a hydraulic wheel press was repaired, the part welded having to stand a pressure of 60 tons per sq. in. The original "strong back" holding the wheel against which the axle was pressed was not strong enough for the purpose until repaired by thermit. Cylinder covers are also repaired by thermit and have been made as good as new. Work with gray iron castings requires more experience, in regard to preheating and cooling down gradually—more thermit is necessary to effect the weld, on account of a hard, glassy scale on such casting, which resists fusion, and in addition of Ferro-Silicon (about 2 percent) is advisable to prevent hard spots at the lines of junction between thermit steel and cast iron.

The most important application of the thermit process is for making a continuous rail. The process having been brought to a high state of perfection in Europe before coming here, there was little room for changes in practice. About 30 different cities are investigating the process in actual operation and about 5,000 joints have been put in up to date. All these roads recognize in the thermit process the best and simplest means of joining rails for electric traction, as long as care is taken to do small and simple things right. Competitors in the field of rail-welding may send out fanciful blueprints about broken joints, to create unfavorable impressions, but such maneuvers prove nothing beyond the fact that they admit the success of the thermit process in this field.

Some tests may be of interest. A heavy double trolley car was taken over a welded joint with supports 13 ft. away, without breaking it.

To decide whether the head of the rail got softer, micrometer caliper measurements were taken of depressions made under equal blows of a steam hammer, by a blunt tool hardened at the head, ¼ in. in diameter.

½ in. away from the joint the depression was 0.1432 in.

3 ft. away from the joint the depression was 0.1596 in.

The electric conductivity of the thermit joint is recognized to be higher than that of the rail, due to increase of area, and is permanent.

That steel foundries should have been the first to recognize the possibilities of liquid steel that can be produced anywhere in half a minute, goes without saying. There are already several of the largest with whom thermit is as much a necessity as foundry sand. Some prefer—for no apparent reason—not to disclose the fact that they repair faults in castings by thermit, but all can openly admit that they use it to reduce the size of their risers, an application which, through its simplicity, recommends itself to all foundries—gray iron as well as steel. Thermit thrown loosely or in a paper parcel on steel, will ignite and keep the contents of the riser fluid even after the metal has become plastic in the casting. Liquid cast iron will only ignite thermit in the presence of the ignition powder.

The application of thermit to reduce the piping in ingots, although very simple in itself, necessitates some liquid steel being held in readiness to fill up the piping after the solidification has been interrupted by a thermit reaction. This should not be impossible to arrange.

RIEHLE BROS., TESTING MACHINE CO.

Tests on Malleable Iron Bars Cast at Pennsylvania Malleable Co.'s Works, McKees Rocks, Pa.

Before Titanium Thermit Reaction.

	Dimensions.	Ultimate Strength, Pounds.	Deflection, Inches.
No. 1—1	1.000x .999	4100	1.00
1—2	.995x .999	4500	.98
1—3	Lost in anneal.		
2—7	1.000x .998	4540	1.28
2—8	1.012x1.000	4610	1.40
2—9	1.012x1.006	4610	1.40
2—9	1.006x1.005	4500	1.40
	Average before treatment.	4450	1.212

After Titanium Thermit Reaction.

	Dimensions.	Ultimate Strength, Pounds.	Deflection, Inches.
No. 1A—4	1.011x1.010	5020	1.30
1A—5	.999x1.000	4200	1.27
1A—6	.989x .995	4850	1.55
2A—10	.995x .996	4620	1.47
2A—11	.998x .996	4410	1.37
2A—12	1.011x1.000	4810	1.44
	Average after treatment.	4811	1.60

Another branch of Alumino-Thermics which will be of interest, is improvement of gray iron castings, by the introduction of titanium thermit in the ladles, by immersing it in a cartridge below the surface of the metal. Some experiments, thanks to our fellow-member, Dr. Moldenke's, kind intercession, were made at the Pennsylvania Malleable Works, with the foregoing results, the bars having been poured out of the same ladles, one before, the other after, the titanium thermit reaction.

Experiments with lower grades of iron showed the same favorable results. At the Featherstone Foundry, Chicago, titan thermit treated test bars showed a tensile strength of 3,550 lbs., against average untreated, 3,250 lbs. The metal, after treating, is much denser, but can be easily machined. Incidentally it may be mentioned that by the introduction of a 1¼-lb. cartridge of ordinary black thermit into an 800-lb. ladle, 40 lbs. of steel borings can be melted without difficulty. This necessarily very short account of what is doing in thermit cannot, of course, cover the entire field of the applications, but will perhaps tend to convince those who had rather be guided by results obtained elsewhere than spend time and money upon what they think experiments, and encourage others who are doubtful from lack of experience by showing them what has been accomplished in actual practice.

The International Mercantile Marine Co., better known as the shipping combination, has just filed its annual report for 1904. Owing to the frequency with which the annual meeting of the company adjourned it was felt that the showing for the year was probably unfavorable; but no one expected it to be quite as poor as it really is. The company met with several obstacles to profitable operation last year, principally

CONTINUED ON PAGE 28

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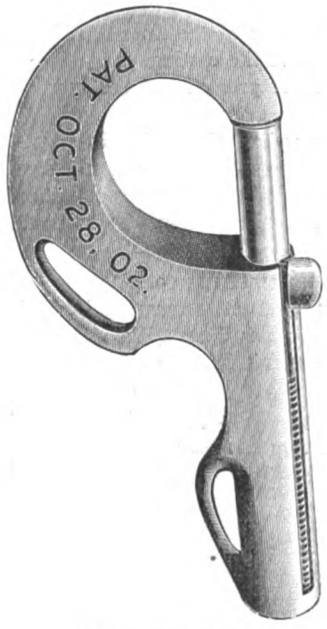
NEW SAIL HOOK

Capt. John M. Into, of yacht-racing fame, has recently invented and perfected a sail hook, as shown in the accompanying cut, which is made to replace the "old style" hitching hooks. The Into hooks are proportioned with mathematical accuracy in order to safely meet the severe strains brought to bear upon them during a race. They are quickly operated, a feature which is most necessary, as a loss of ten seconds at a critical moment, during the changing of a sail, might give a competitor the lead and the race.



INTO SAIL HOOK.

These hooks have been used with success on the Columbia, Reliance, Ingomar, and Atlantic, and have been adopted by the Herreshoff Mfg. Co., Ratsey and Lapthorn, and others. A letter from Capt. Chas. Barr, of international racing fame, is herewith appended:

"In reply to your letter, I beg to say that the reason we adopted your patent spring hook was because the ordinary snap hook, which we first used on the Columbia, was always getting afoul of something at a critical time and causing us lots of trouble. On many occasions the balloon jibtopsail hooks caught the spinnaker and, besides tearing the sail, badly delayed us in getting the sails in and on one occasion was the cause of our competitor getting past us. I have since used the Into hooks on the Reliance and the Ingomar and have never known it to foul anything, and the crew find it easy to work."

The Delaware Marine Supply Mfg. Co., of Wilmington, Del., the sole manufacturers of the hooks, are busily engaged in meeting demands for the coming season.

STAYMAN VALVE ON THE ROOSEVELT

The Stayman valve, manufactured by The Stayman Mfg. Co., 143 Liberty street, New York, has been successfully installed on the Peary Arctic ship the Roosevelt, and it is understood that every mechanical man on board was extremely well pleased with its action. The engine was a new one with the customary plug piston which leaked. At the request of Com'dr Peary the original valve was removed and replaced by the Stayman valve. The action of the valve was so noticeable that the engineer and his assistants were surprised to see the engine start immediately upon the mere touch of the throttle, where with the old valve and other conditions remaining the same, it was necessary to open the throttle half way before the engine would budge. The company believes that this demonstrates very conclusively that the Stayman valve is absolutely steam tight when in good working condition, which cannot be claimed for any other type of piston valve, excepting where snap rings are introduced with their liability of breaking. The Stayman Mfg. Co. are also manufacturers of steam piston, pump piston and metallic packing.

The greatest searchlight in the world has just been built at Berlin by Siemens & Schubert for the Russian government. It is of 316,000,000 candle power.

TRADE NOTES

That the steam turbine is rapidly increasing its foothold in the power field is evidenced by the remarkable increase in manufacture of the well known Westinghouse-Parsons type. During the six months ending June 30th, 1905, The Westinghouse Machine Co., exclusive builders of the Westinghouse-Parsons type, have contracted for no less than 82,000 kilowatts in turbo-generating machinery, averaging nearly 1,175 Kw. capacity per turbine unit. These machines range in size from 200 Kw. to 7,500 Kw. The latter will be the largest turbines in the world, and three units of this size are under contract for Greater New York railway and lighting power stations. In the distribution of these machines among the various industries, the electric railway has claimed the largest number of machines, averaging 1,496 Kw. in capacity; next in order, industrial plants, averaging 571 Kw. capacity, and light and power plants, averaging 1,529 Kw. capacity. In the order of total capacity, railway plants have required 38,900 Kw.; lighting plants, 26,300; industrial, 12,000; miscellaneous 4,800. This list bears excellent witness to the increasing possibilities of the turbine, and presages a brilliant future. The equipments noted represent solely actual sales only and not including contemplated business or partially closed contracts.

The Fisher Electrical Works, Detroit, Mich., are builders of dynamos, motors, special electrical machinery, switch boards and circuit breakers. They also repair electrical machinery of every description and have a full set of commutator chucks from 2 in. to 20 in. in diameter. The company has furnished the way and navy departments with a great many of its machines.

The B. F. Sturtevant Co. of Boston, Mass., has just issued a second edition of their Bulletin No. 63, showing generating sets in a full line of 36 sizes ranging from 3 to 100 K. W., and equipped with vertical simple, vertical compound or horizontal engines, according to size. All of these engines are equipped with forced lubrication, watershed partitions and oil tight cases.

The Armstrong Cork Co., Pittsburg, Pa., has opened a store and office at No. 103 East Pearl St., Cincinnati, O., under the management of Mr. J. L. Hawkins, formerly connected with their branch house at Baltimore. The store will carry a full line of cork and cork products and cater especially to the Cincinnati trade.

The Union Iron Works, San Francisco, has just laid the keels for the two steamers it is to build for the American Hawaiian Steamship Co. One of these steamers will be named Mexican and the other Columbian. They will be twin screw steamers of 13,000 tons with furnaces designed to burn oil.

The De Laval Steam Turbine Co. has just put out Bulletin No. 10, giving a sketch of the works and products of the company and also a sketch of the Dr. De Laval, the inventor of the turbine which bears his name. The catalogue is one that will be preserved for the information which it contains.

Bailey & Co., 328 West street, New York, are engaged in marine plumbing of all kinds and are building up quite an extensive business. Mr. Bailey, who has but recently started in business for himself, was formerly the head marine man for H. A. Calkin, Jr.

The Sotoyome, said to be the largest gasoline schooner in the world, made her trial trip in San Francisco Bay on July 16. She is 680 tons and is equipped with Union gas engines burning crude oil and developing 300 H. P. She will run between San Francisco and Albion.

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ASTOR, LENOX AND TILDEN FOUNDATIONS

VOL. XXXII. CLEVELAND, O., JULY 27, 1905. NO. 4.

TESTIMONY

from users of the Diamond Steam Flue Blower——read it.

Cleveland, Ohio, May 2, 1905.

The Power Specialty Co.,
Detroit, Mich.

Gentlemen:—Replying to your letter of the 28th we note you will not be able to make immediate shipment of the order given you the day before for one hundred Diamond Steam Flue Blowers. It will be agreeable to us if you will make these shipments about thirty each month, same to be delivered during this season.

Yours truly,
THE GILCHRIST TRANSPORTATION CO.
J. C. Gilchrist PRESIDENT.

This order was given by the above firm after testing and using a few of the Blowers for a period of two years.

Wisconsin & Michigan Railway Co.
and
Lake Michigan Car Ferry Transportation Co.

Chicago, Ill., May 17, 1905.

The Power Specialty Company,
Detroit, Mich.

Dear Sirs:—I beg to hand you herewith check in payment of the Diamond Blowers recently furnished for the Tug S. M. Fischer.
I am pleased to be able to say to you that the blowers meet our expectations in every respect and I believe the device an excellent one for Marine boilers.
Yours very truly,
J. N. Faith

Diamond Steam Flue Blower

This testimony is convincing, but we will send you one on trial for thirty days free.

The Diamond Flue Blower works from the rear of the boiler with the natural draft. Cleans the tubes in 5 minutes by a simple twist of the handle. Place your orders early.

Power Specialty Co.

500 Washington St., DETROIT, MICH.

WINDSOR, CANADA **BERLIN, GERMANY**

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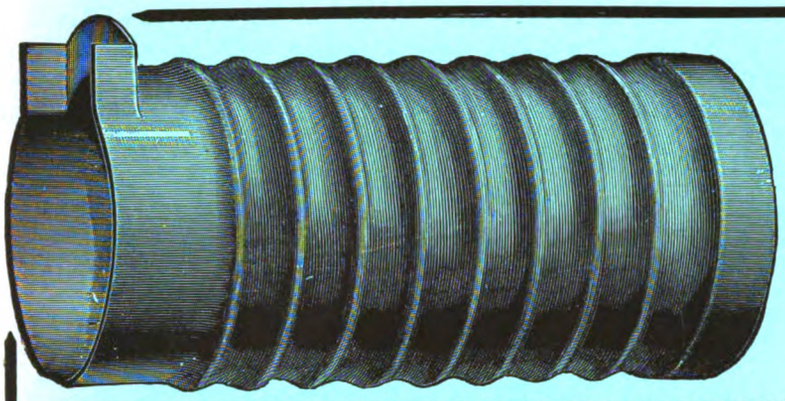

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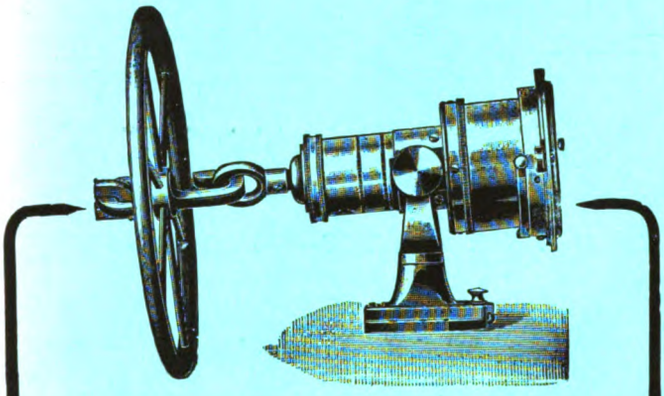

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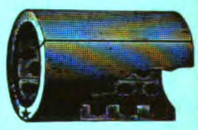

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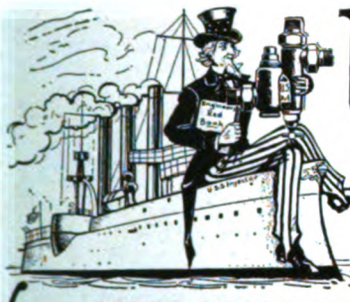

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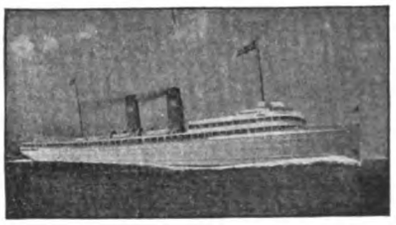

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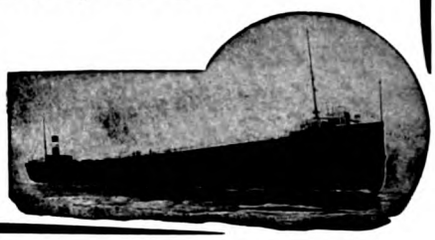

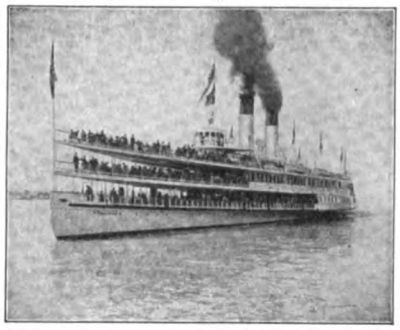

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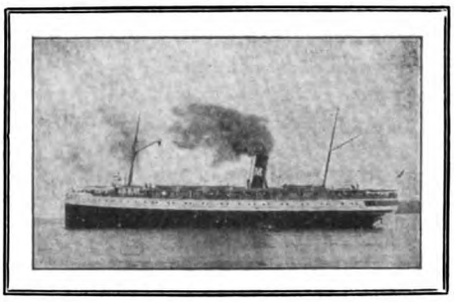

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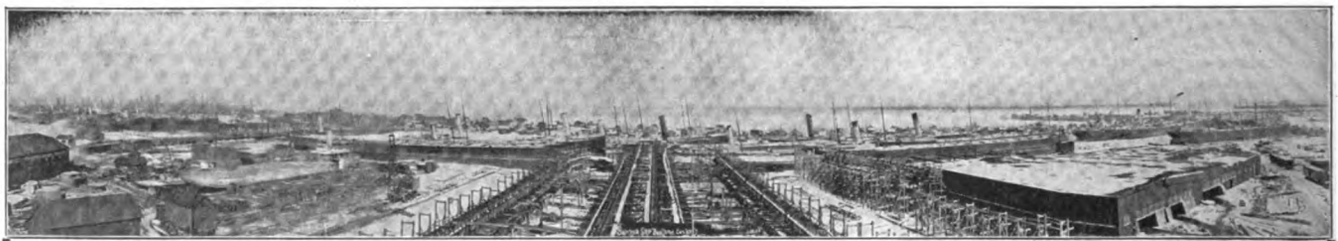

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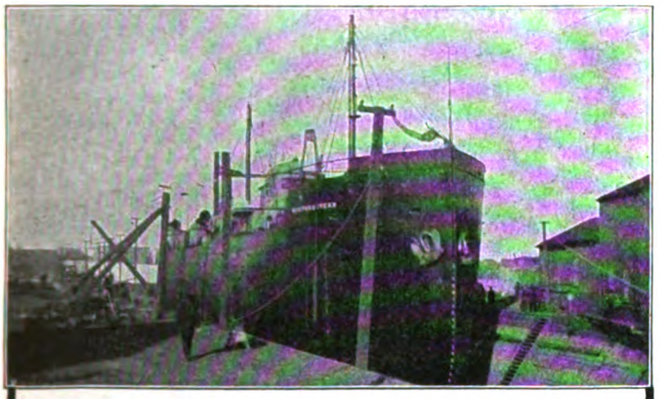

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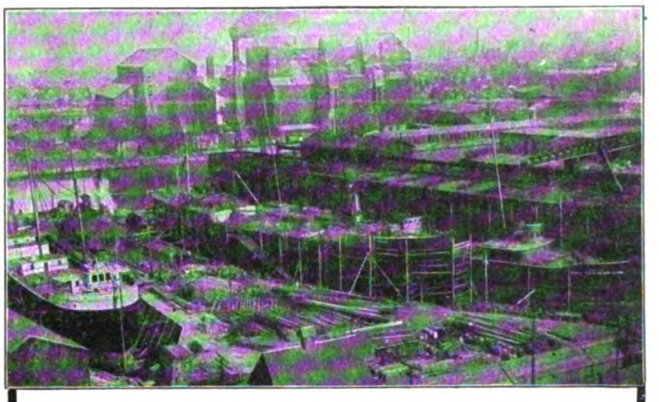

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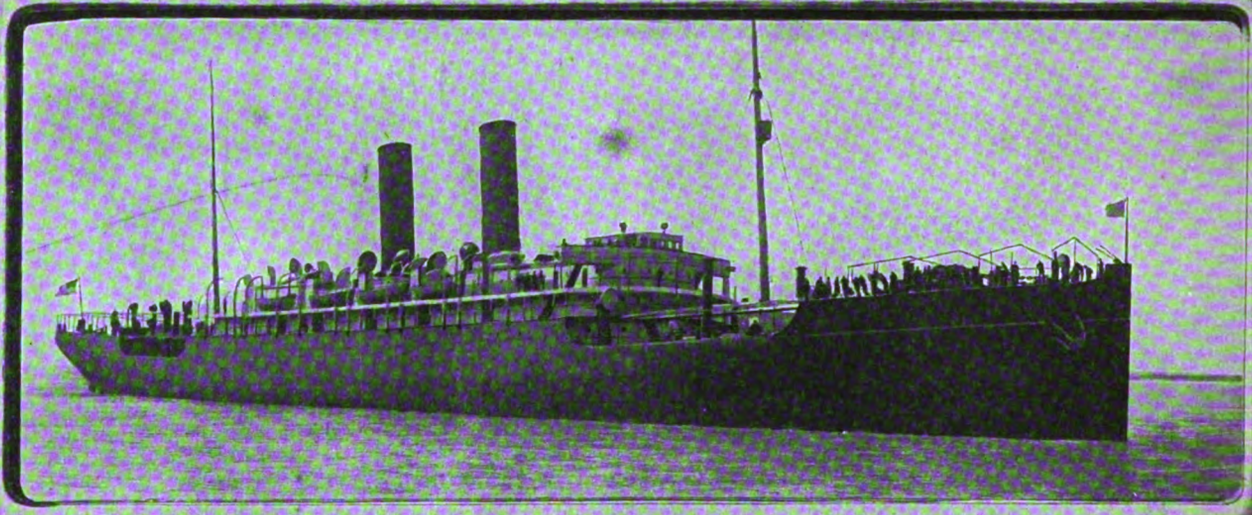

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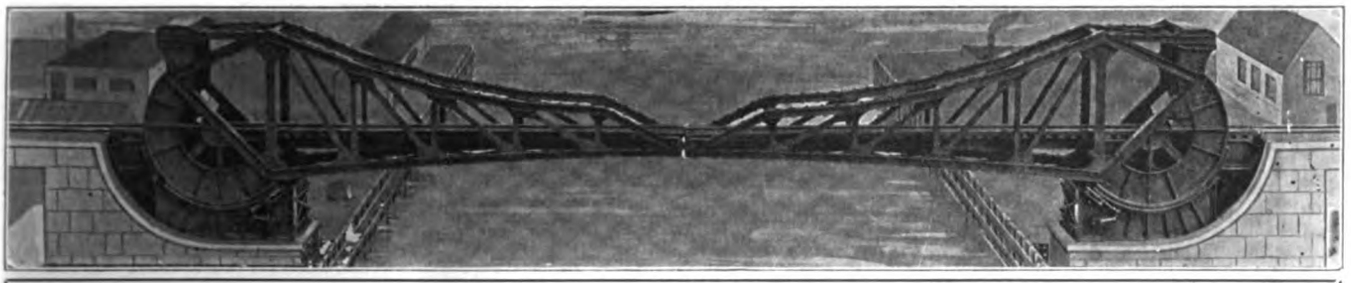

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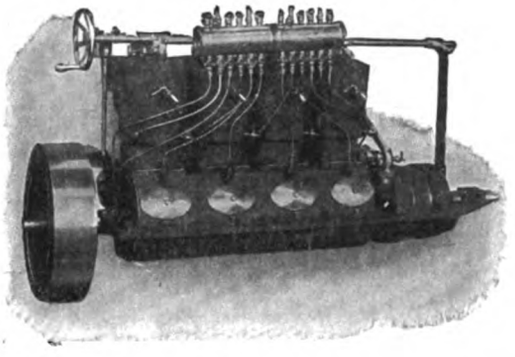

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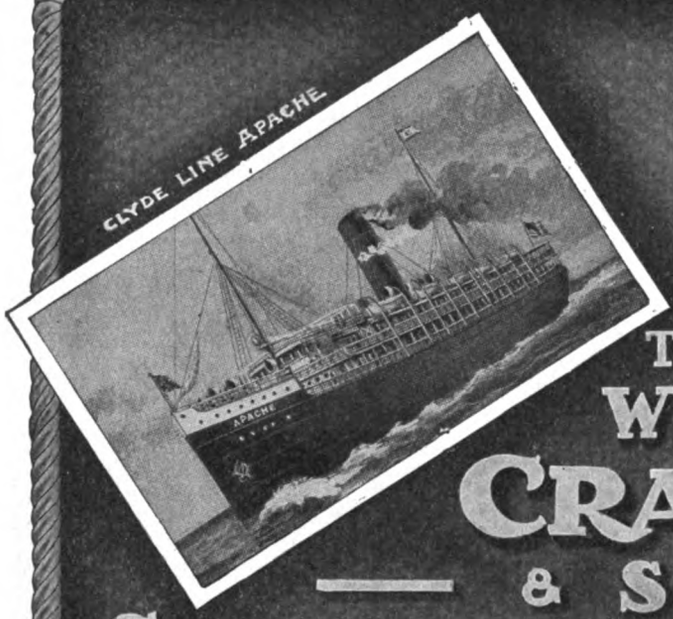

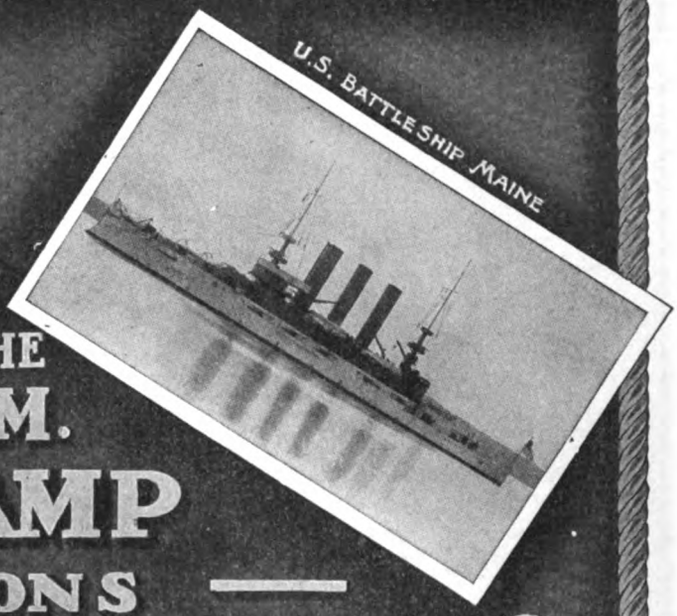

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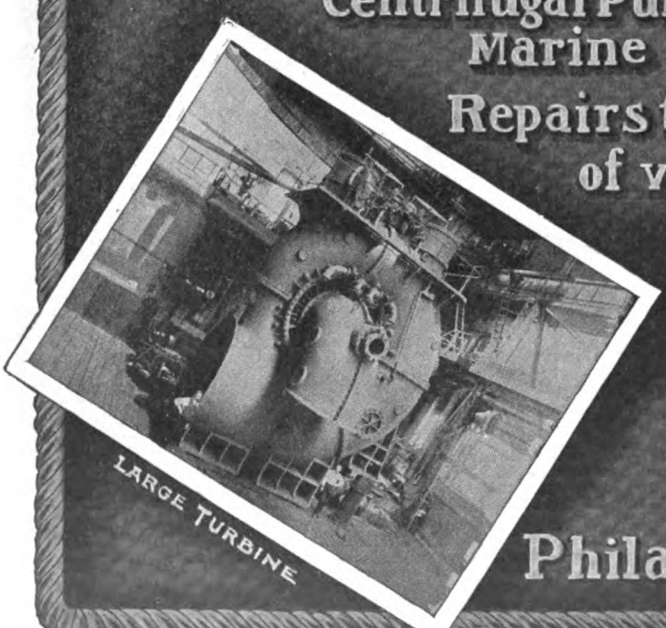

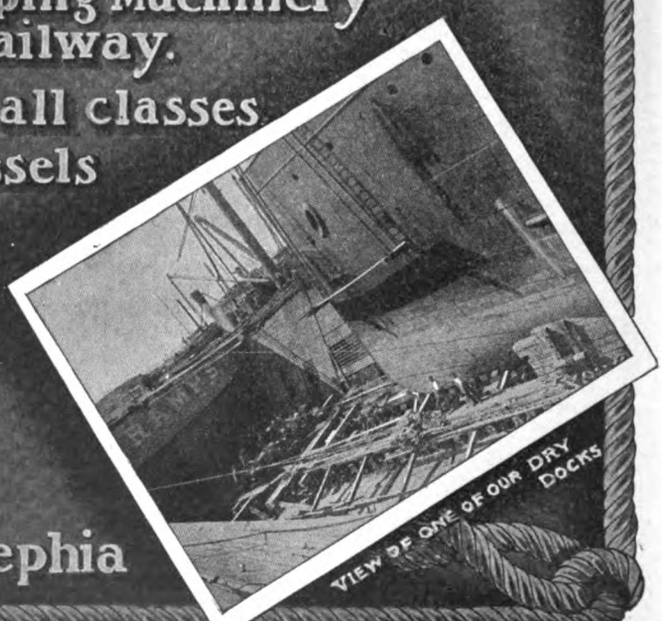

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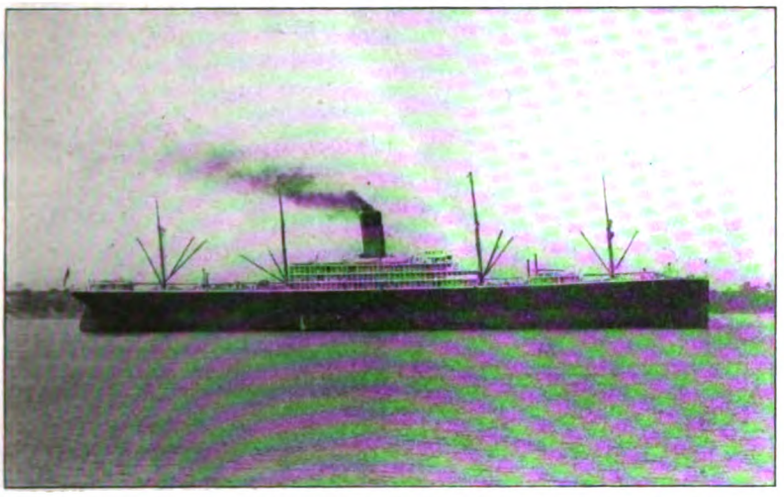

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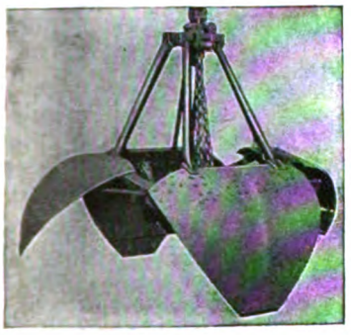

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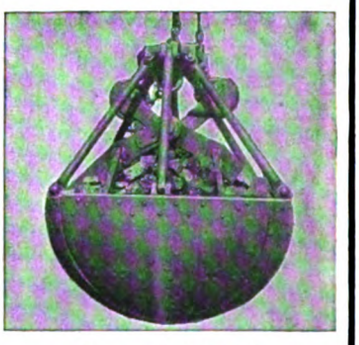

Orange Peel Closed showing load

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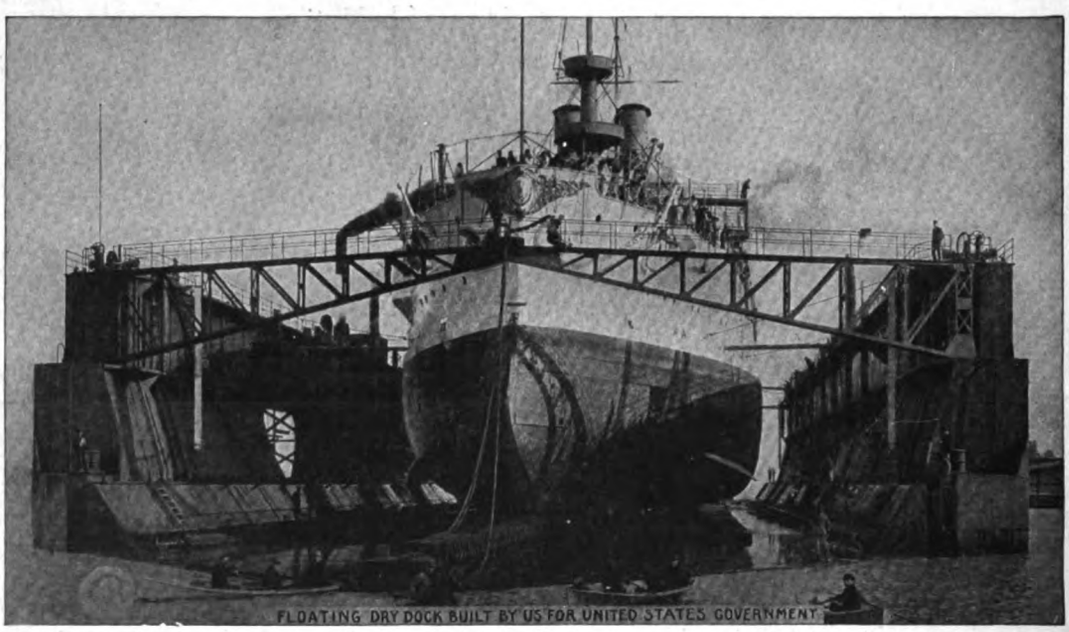

FLOATING DRY DOCK BUILT BY US FOR UNITED STATES GOVERNMENT

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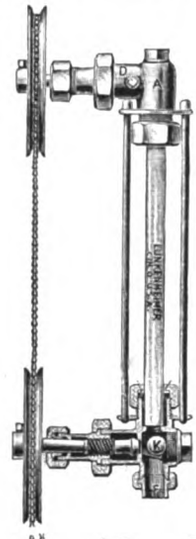

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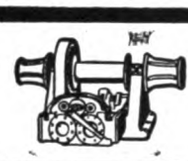

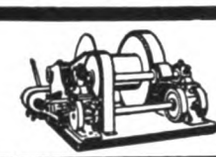

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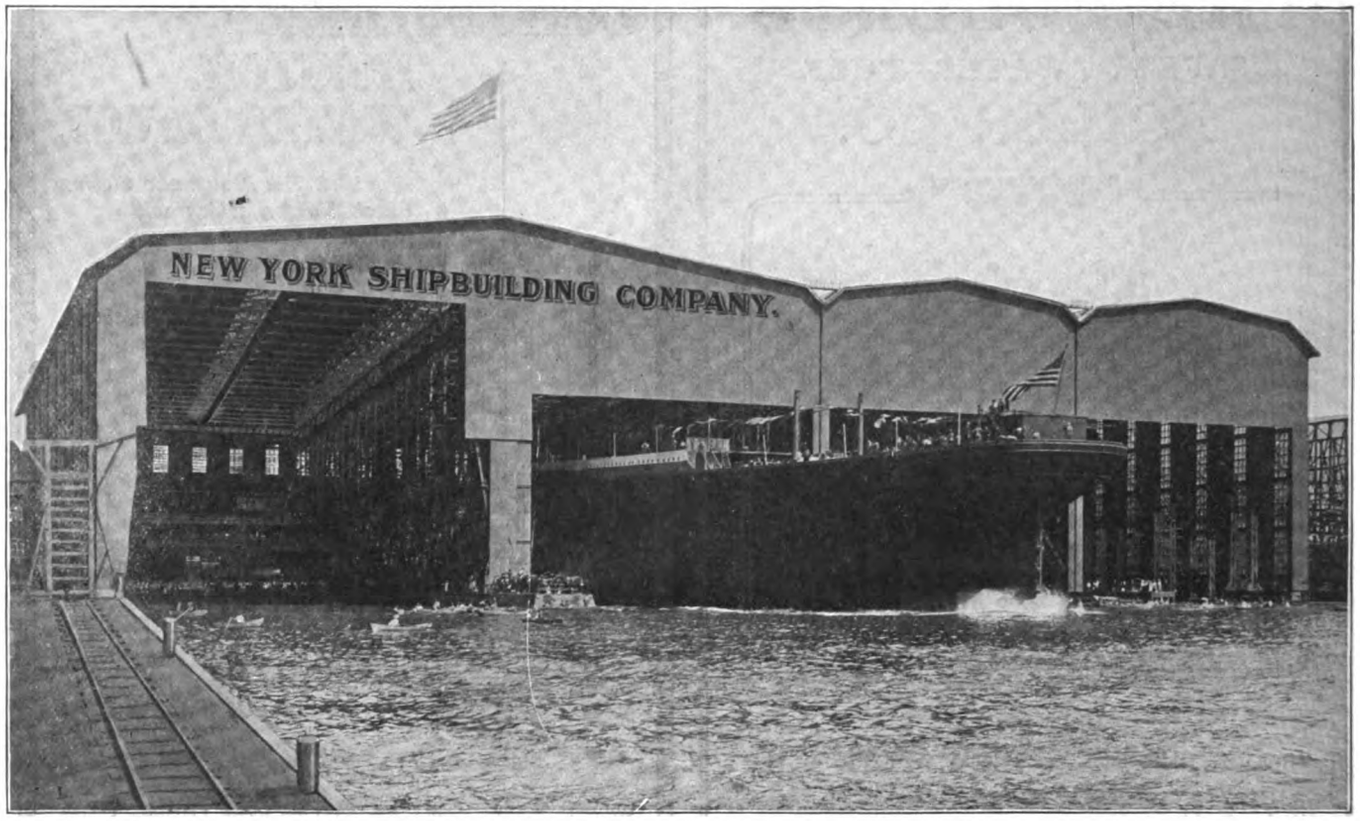

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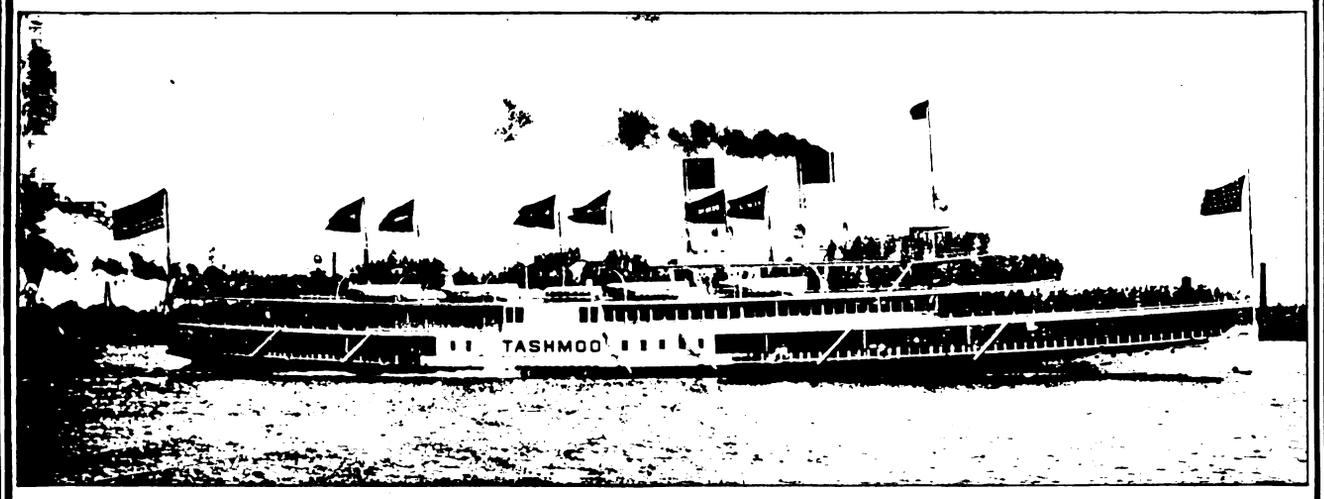
Beautiful Marine Views



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Detroit in the Ice. (Transfer Steamer. Two Views.
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Eastern States. (On the Ways—Three Views.)
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Fairbairn.
H. C. Frick.
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Glidden—Wreck of, in St. Clair Ship Canal.
Greyhound.
Hanna, M. A.
Harlem.
Harvard. (On the Ways).
Harvard. (The Launch).
Harvard. (In the Slip—Two Views).
Helena.
Hennepin.
Holley, Alexander (Whaleback towbarge.)
India.
Islander. (Thousand Islands—Three Views.)
Frank E. Kirby at Put-in-Bay.
Lagonda discharging coal at docks.
Lackawanna.
Mahoning.
Manitou.
Majestic. (Three Views).
Michigan Central in Detroit River. (Winter.)
Mohawk.
Montana.
W. B. Morley, wreck in Detroit River, Aug. 6, 1899.
Simon J. Murphy. (On the Ways).
Simon J. Murphy. (On the Ways—Two Views).
Simon J. Murphy, Launch. (Bow in Slip, Stern not yet in Water.)
Neshoto.
New Island Wanderer. (Thousand Islands).
New York. (Thousand Islands—Two Views).
North King. (Thousand Islands).
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North Land, in the "Soo" Locks. (Two Views).
North Land, at Mackinac Island. (Two Views).
North Land at the Docks, Mackinac.
North Land and North West in Winter Quarters.
North West.
Ongiara. (Two Views).
Ontario, in the Ice. (Transfer Steamer).
Pathfinder, in the Locks.
Peerless, at Mackinac Island.
Pere Marquette No. 17.
Plankinton at Northwestern Coal Docks, Duluth.
Pleasure, at Dock (Detroit Ferry).
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Princeton.
Ramapo.
W. D. Rees.
Rensselaer.
Rube Richards, in Ship Canal at Duluth.
St. Lawrence (Thousand Islands).
Ste. Marie, in Mackinac Straits.
Howard L. Shaw, (On the Ways—Three Views).
Howard L. Shaw. (The Launch).
Howard L. Shaw. (In the Slip).
Sir William Siemens.
George Stone.
Superior. (Steel Trust Tender).
Tashmoo. (In Dewey Naval Parade, Detroit River).
Tashmoo, June 9, 1900.
Tashmoo. (Entering St. Clair Flats Ship Canal).
Tashmoo. (Landing at Star Island—Two Views).
Thompson, A. D. (Whaleback).
Toronto. (Thousand Islands).
Toronto. (Thousand Islands — at Alexandria Bay).
Toronto. (Thousand Islands — at Gananoque).
Transport, in Detroit River, Winter. (Car Ferry—Two Views.)
Troy.
Uganda, in Ship Canal at Duluth.
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Lackawanna Coal Chutes, two views.
Lackawanna Ore Docks—unloading ore.
Lackawanna Ore Docks—unloading ore and loading coal.
Unloading Ore from Whaleback, two views.
Unloading Wheat into Elevators, two views.

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Peavey Elevator.
Ship Canal (Looking in) two views.
Ship Canal (Looking out).
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The Bluffs.
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Steamer Lagonda discharging coal at S. S. Ry. Coal Docks.
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Str. North Land at the Dock.

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Locking a Big Steamer.
Locks showing high and low level.
The Locks.
General View of Locks from Offices.
Poe Lock, from below, closed.
Poe Lock, from below, open.
Poe Lock, from above.
Poe Lock, with Whaleback.
Whaleback Str. Pathfinder in the Locks.
St. Marys River, South from the Locks.
Weitzel Lock, from above.
Weitzel Lock, from below.
Str. North Land Passing Locks, two views.
Upper Entrance to Lock Canal.
Gate Mechanism.
Interior of Power House.
Canadian Lock from Upper End.
Canadian Lock from Lower End.
Steamers Entering and Leaving Poe Locks.
The Rapids, looking up.
The Rapids, looking across.
Indians fishing in the rapids.

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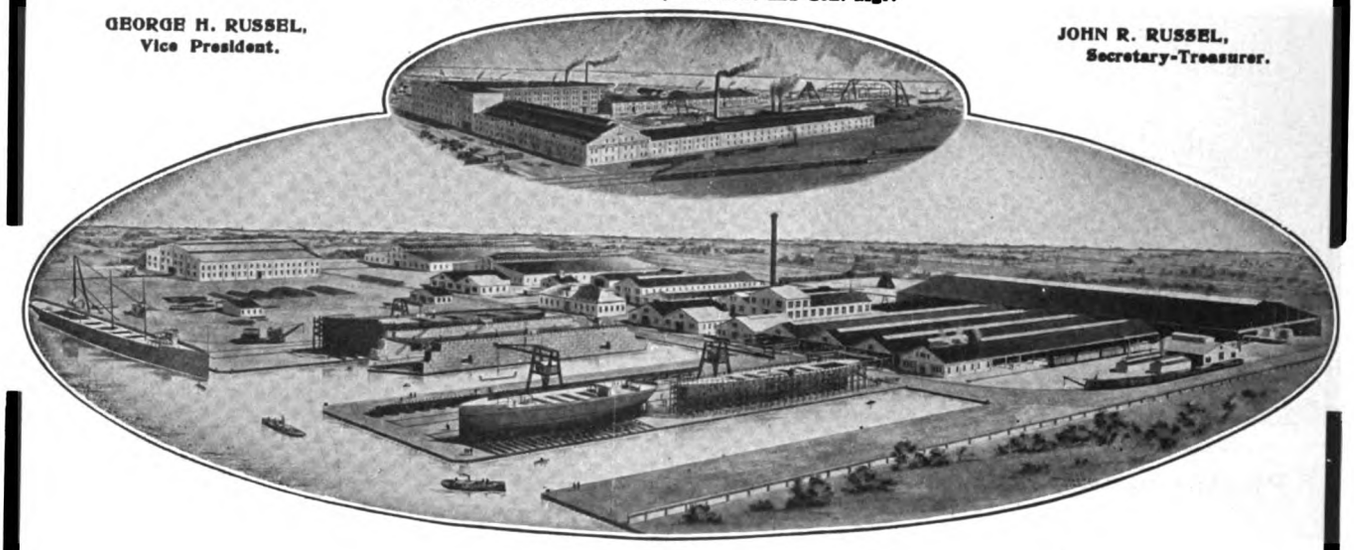

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See accompanying index of Advertisers for full addresses of concerns in this directory.

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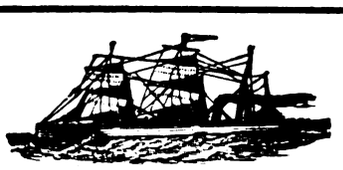

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Hall, John B.....Buffalo.
Helm & Co., D. T.....Duluth.
Hawgood & Co., W. A.....Cleveland.
Holmes, Samuel .....New York.
Hutchinson & Co.....Cleveland.
Lester, S. S. .....Quebec, Can.
McCarthy, T. R.....Montreal.
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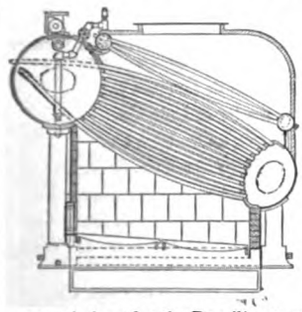

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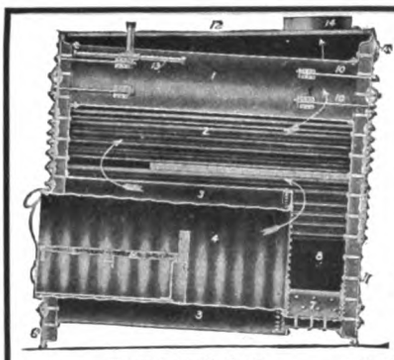

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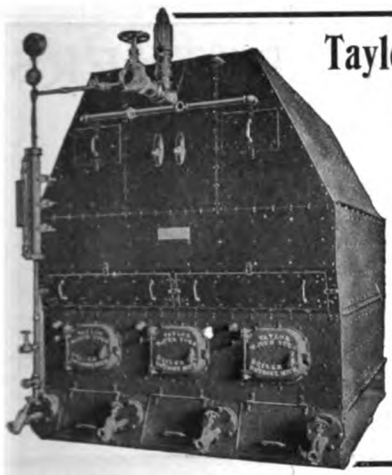

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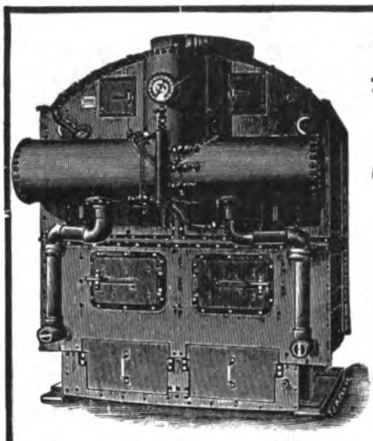

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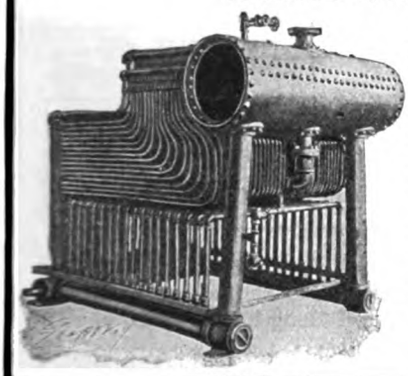

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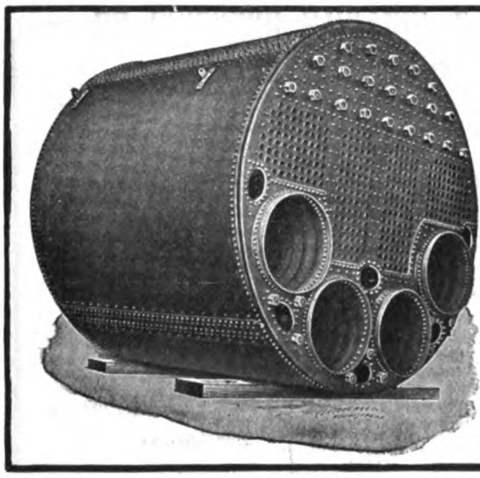

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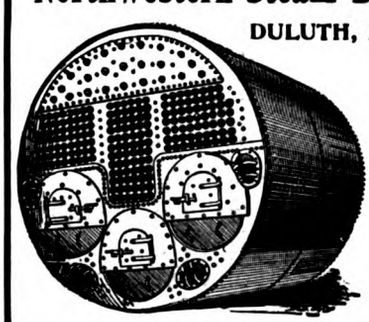

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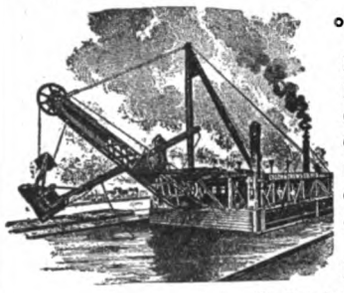

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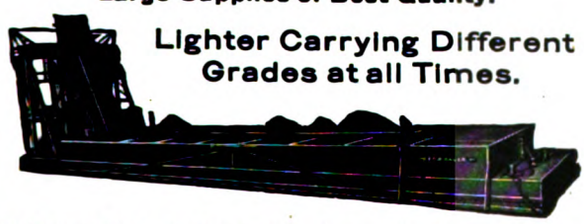

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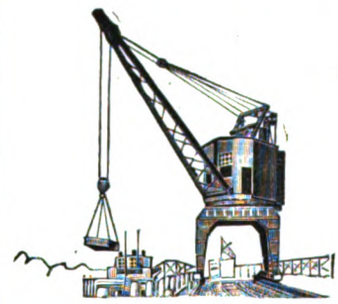

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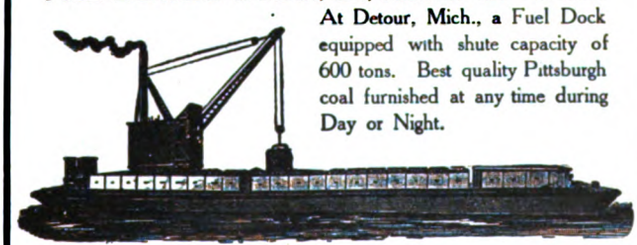

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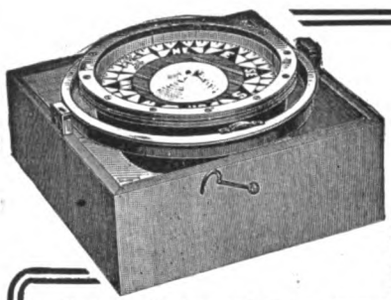

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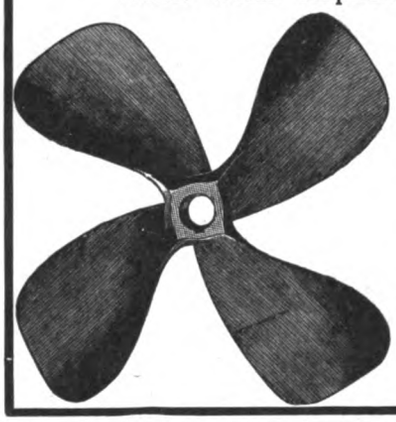

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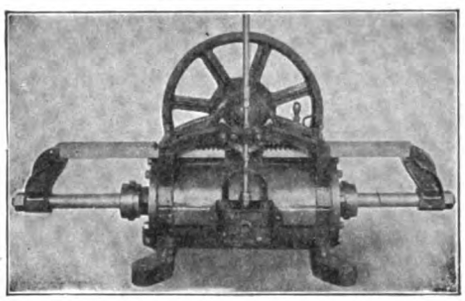

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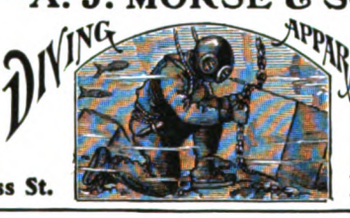

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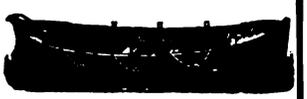

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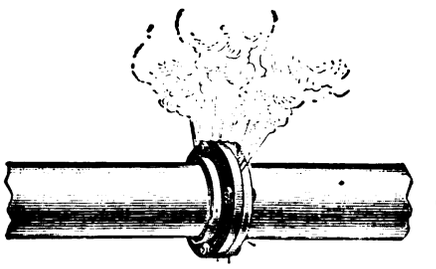

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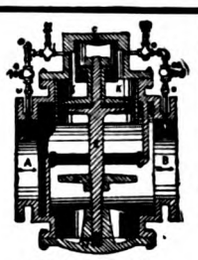

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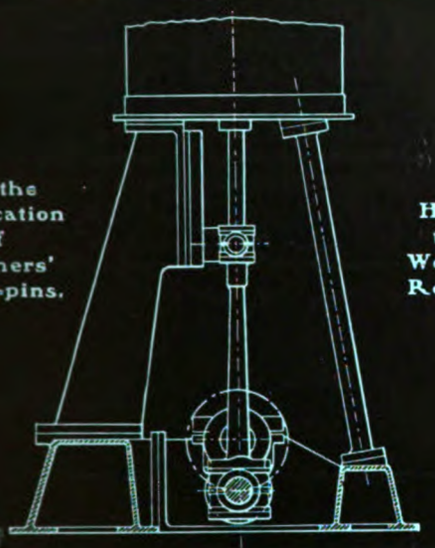

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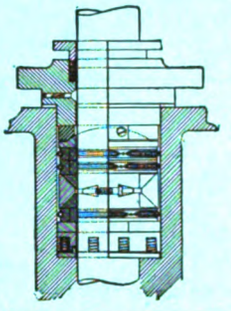

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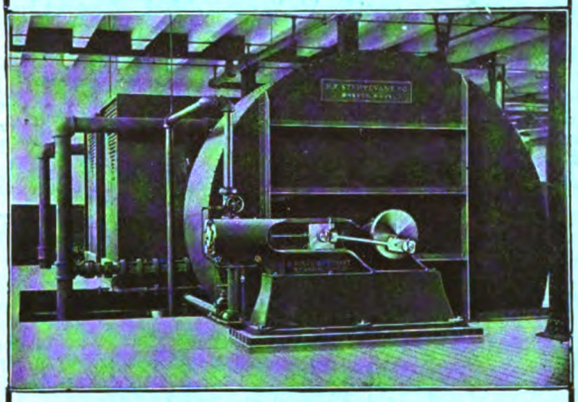

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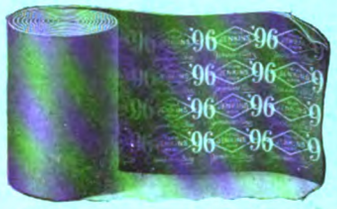

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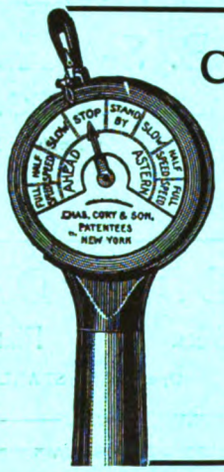

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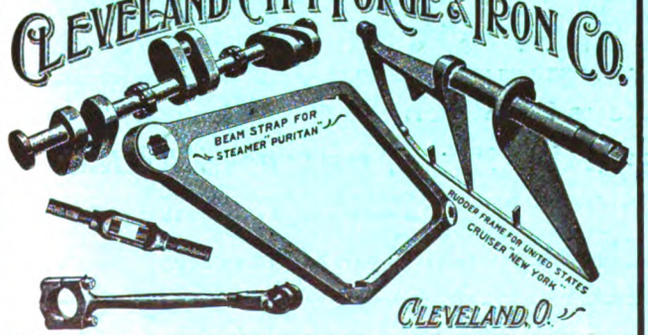

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